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# Canada: the Situation Reviewed.

FOR many years past we have devoted so much space to the progress of electrical affairs in Canada; to the position of the British trader in relation thereto; and to the prospect awaiting the young electrical engineer from this country in finding an outlet for his energies there, that our older trade readers will already be acquainted with the complexity of the problem as it has presented itself in the past. After the regular reader has had placed before him periodically by our Special Correspondent—an Englishman with twenty years close observation of Canadian matters on the spot—and by eminent official and other authorities (among them the late Sir Adam Beck) a faithful account of the situation at its various stages of development, it might have been thought that Canada should have yielded the same measure of business to this country as other markets have done because of the interest aroused. But our articles have shown in detail the peculiar handicaps which have stood in the way of those who have seriously set out to tackle the problem.

At various times principals and directors have reported to us personally of their visits, some declaring the situation an impossible one not worth while, and others telling a quite different story—sometimes influenced by the part of Canada concentrated upon and all naturally influenced by the class of product that they had for disposal and its suitability or otherwise for Canadian use.

We, and our authors and correspondents, have provided our manufacturers with advice from which they could deduce whether or not the time had arrived for them to launch out where the trading, financial, and geographical influences and advantages of the United States were so deeply rooted. The Leonard Andrews co-operative branch effort; the Hamilton Wickes (Trade Commissioner) investigation of the Chicago Underwriters' influence and network so obstructive to British enterprise; the efforts of this journal in assisting that investigation and in trying to break the southern control of Canadian electrical practice; these

were among the earlier stages of British effort in which the REVIEW played a part and often rendered a service which can never be told in print.

We have also related from time to time the story of the wonderful development of Canadian hydro-electric resources for the publication of information concerning which we have the assistance to-day of the authorities on this side; and have recorded the remarkable progress that has taken place in the domestic load in circumstances specially favourable to its development. The reports of various Trade Commissioners and other authorities, and electrical import and export trade statistics regularly appear in our pages. Further, we have frequently been visited by Canadian traders who have sought our help in placing them in touch with British firms whom they desired to trade with or represent.

If all of the material mentioned in the foregoing, and much that space prevents the mere mention of, could be brought together in a volume, it would convince the reader, if he needed convincing, that a single trade journal consistently conducted over a lengthy period furnishes an export service of inestimable value; and what it has done in the case of Canada it has done in like manner for many other parts of the world, until the ELECTRICAL REVIEW has won the reputation of being a compendium of overseas electrical information and its offices are known as an inquiry bureau for overseas visitors.

Standing to-day on what we trust is the threshold of an era of unparalleled electrical development everywhere, reflections such as these in which we now indulge, fill us with a sense of responsibility, coupled with a hope that we shall receive the fullest co-operation of the manufacturers and traders who earnestly seek to do larger business overseas, and that our overseas readers will continue to avail themselves of our ability and willingness to help them to keep in close touch with movements that are in progress in Britain.

We have struck this note again just now because we think it should give spirit and enterprise to everybody's endeavours at the beginning of the new year, and in doing so we refer the reader to a quite up-to-date review of the electrical situation as it appears to be developing in Canada, which is published on later pages to-day. It emanates from the mind of a writer who is at the heart of things there, who has served the industry on a score of occasions in this and many other ways, and who has gone to the trouble of collecting the views of a number of other responsible gentlemen which are embodied in the article. It constitutes a very careful study. Past reviews have contained alternating hopes and doubts and fears; there are still doubts whether the industry will rise to the occasion, but the whole summary seems to suggest that the time has arrived for strong action to be taken if we are to find our true place in Canada. It will be observed by older readers that many things are just as they were—former criticisms unfortunately still stand—but some important ones are altering, and what the writer and his co-operators say should afford just enough information to give us on this side a sufficient measure of reliable guidance.

We pass these very practical messages on to readers of the ELECTRICAL REVIEW and hope that they will be of great value at a time when every possible effort must be made to increase export trade.

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**The British Industries Fair.**

CONTINUING in the spirit engendered by contemplation of the subject of our leading article, we find it equally appropriate at the beginning of the year to refer to the first great electrical trade effort that will be made at home in 1930—from February 17th to 28th, at Castle Bromwich, Birmingham, and at Olympia in London.

As our readers are aware, it is our regular practice to devote considerable space each year to this event. In this huge demonstration of Great Britain's industrial capabilities we have for some years taken a foremost part, and the progress made fully justifies all the attention which has been given to it. Once again we wish to urge all our readers to make early arrangements for a visit this year: to both sections if possible, but certainly to Birmingham. The Electrical Section at Birmingham is a very important part of the Fair and, as will be seen from the list of exhibitors which we publish in this issue, a representative display is again assured.

We believe that a good deal of actual business results from the Fair and that, although some exhibitors may have expressed disappointment in the past, the bulk of our concerns have no reason to regret having taken space in the display. Its continued rapid expansion is surely sufficient proof of this statement.

As before, thousands of invitations have been issued to foreign and Dominion buyers, and official visits, of which particulars are detailed on another page to-day, will again be a valuable feature. Thus there will be ample opportunity for the exercise of salesmanship in a favourable atmosphere.

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**The Price of Electricity.**

THE letter from the Director of the British Electrical Development Association, which we publish in our "Correspondence" columns, contains much to encourage those interested in the development of electricity for the home. Out of a total of 630 undertakings distributing electricity, 280 are shown to charge for domestic purposes 1d. or less per kWh all the year round. The importance of this total can only be determined by comparison with the previous year. In 1928, only 186 undertakings came within the same range, so that the increase was rather more than 50 per cent. During the same period 65 undertakings included in the above total dropped their charges to 0.75d. per kWh or less, raising the number in this section from 59 to 124, making 110 per cent. increase. Those charging 0.5d. per kWh are given as 33 for 1929, as against only 16 last year, showing this important section to have grown by over 100 per cent. These figures exclude water heating which would expand the total further. Particulars of undertakings charging 0.5d. per kWh for domestic purposes were given in the special supplement to the ELECTRICAL REVIEW of November 15th, when we also commented upon the desirability of a secondary charge of not more than 0.5d. per kWh becoming general, both from the supply engineer's and the manufacturer's point of view. In our Electricity for the Home Section this week, we publish an article by Mr. W. J. Cooper, chief engineer of Hamilton, one of the smallest undertakings in the country—its maximum load is less than 2,000 kW—to institute 0.5d. per kWh as a secondary charge in a two-part tariff. Mr. Cooper lays stress on the interdependence of cheap electricity and diversity of load, and points out that the securing of this diversity rests with the undertaking itself by the adoption of a suitable tariff.

For the progress manifest, considerable credit is due to the E.D.A., as will be apparent from a perusal of the review of the past year's activities of the Association, which we also publish in another column. It is only by education and propaganda on the lines indicated by Lieut.-Col. W. A. Vignoles that electricity for the home will make the progress to which its merits entitle it and, we believe, the greater the support given to the work of the E.D.A. the sooner will results of a far-reaching character be achieved.

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**The Physical Society's Exhibition.**

THE nineteenth joint annual exhibition of the Physical Society of London and the Optical Society will be held on January 7th, 8th, and 9th at the Imperial College of Science and Technology, South Kensington. The display is arranged to indicate the year's progress in the design and construction of electrical, physical, and optical apparatus, and has come to be regarded as one of the leading scientific events of the winter.

# The Electrical Trade Position in Canada.

**Our Canadian Correspondent, who for many years past has periodically reported in our pages upon the development of the electrical engineering industry and trade in Canada, summarises the present position of affairs in the following contribution; opinions, criticism, and suggestions offered by various authorities are quoted, and the view is expressed that a concerted attack on the market by British companies and firms would be well-timed.**

By A. S. L. BARNES, A.M.I.E.E.

THERE is ample justification for a review, at the present time, of the subject designated by the title of this article in the fact that last year Canada occupied the fifth position among the nations of the world in import and export trade; she was second in export and total trade *per capita;* third in favourable trade balance and second in favourable balance *per capita*. Canada leads the world in exports of wheat, newsprint paper, nickel, and asbestos; occupies second place in exports of wheat-flour, and third in exports of wood pulp.

From the point of view of Great Britain the least satisfactory feature of Canada's import trade is the dominating place held by the United States. The total value of imports from the last-named country amounted last year to more than four times the value of imports from the United Kingdom.

Canada's proximity to the United States is an unfortunate circumstance for the British trader because, unlike other parts of the Empire, it is, in many cases, United States' standards and United States' methods that rule; moreover, the convenience of being able to reach the headquarters of very many United States' firms by letter, telephone, telegraph, rail and aeroplane, in a very few hours and at relatively small cost, is of great advantage to the manufacturers of that country in meeting competition from Great Britain.

## Electrical Trade Possibilities.

From time to time, years ago, certain British firms attempted to do business here, but whether the time was not opportune, their methods were wrong, or the effort put forth was inadequate, the fact remains that to a large extent failure resulted and Canada, as a prospective market for British manufacturers, was practically abandoned.

Lately, a change seems to be in progress. The high tariffs of the United States (with the prospect of still higher ones in the near future) which militate so effectively against Canada's export trade with that country; the greater prosperity which the Dominion is enjoying at present; the growing tendency, evident here as in several other parts of the Empire, to foster (if the economic situation permits) trade within the Empire—and perhaps other forces unknown to the writer—are all factors in bringing about a brighter prospect for the manufacturers at home.

The electrical trade possibilities of Canada may be gauged from a consideration of the growth of hydro-electric development.

In 1900 the total development amounted to only about 173,000 h.p.; in 1921 it was over 2¾ million h.p.; and at the end of 1928 more than 5½ million h.p. Developments at present in hand, or in active prospect, will in a few years add about two million more h.p. to the present great total. It may be added that the Water Powers Board of the Department of the Interior at Ottawa estimates that the present recorded water-power resources of the Dominion will permit of a turbine installation of approximately 42,000,000 h.p., so that there is still scope for continued expansion for many years to come.

The stupendous development of water-power in Eastern Canada (Ontario and Quebec), which accounts for much the greater part of the total for the whole country, is well known; but a recent feature of such development is the activity in Western Canada, due partly to the growth of manufacturing industries in some of the larger cities and towns—Winnipeg, St. Boniface, Brandon, Portage la Prairie, Saskatoon, Prince Albert, Regina, Moose Jaw, Medicine Hat, Edmonton, Calgary and others—and partly to the opening up of rich mining areas in the north

No less an authority than the Canadian Pacific Railway Company stated not long ago in one of its publications that—"There is every indication that from now on the programs of hydro-electric development in Western Canada will loom up of steadily increasing importance in the Dominion aggregate."

About 30,000 h.p. is being added to the available supply of hydro-electric power in Alberta by a development on the Bow River; on the Churchill River a large project is in hand (the first in Saskatchewan) to supply power to the Flin Flon mine and smelter, and in Manitoba, at two sites on the Winnipeg River, *viz.*, at Seven Sisters Falls and Slave Falls, 225,000 and 100,000 h.p., respectively, are being added to the already large total available.

In British Columbia about 220,000 h.p. will be added during the next two years or so to the nearly one-half million at present developed. The water-power possibilities of the Western Provinces (*i.e.*, from, and including Manitoba, to the Pacific Coast) are estimated to be—for 24-hour power at ordinary six months' flow—no less than 12,580,000 h.p.

In Eastern Canada the largest development at present in hand is that in the province of Quebec recently commenced by the Beauharnois Power Corporation; the ultimate capacity of this one development will be about half a million horse-power. Some of this power will be sold in Ontario to the Hydro-Electric Power Commission whose load is now growing at the rate of 100,000 h.p. per annum.

With the exception of agriculture and railways, the capital invested in the central electric station industry in this country is greater than that in any other industry, amounting to almost $867 millions.

### Canada's External Trade.

It is enlightening to study the figures of Canadian trade with the United States and Great Britain, respectively—the following approximate figures give a good picture of the situation and will indicate to the manufacturer at home what a strong position the United States occupies.

| | | Canadian Trade with | | |
|---|---|---|---|---|
| Imports | Year | United Kingdom | United States | All countries |
| | 1917 | $132,000,000 | $396,000,000 | $519,000,000 |
| | 1929 | 194,000,000 | 868,000,000 | 1,265,000,000 |
| Exports | | | | |
| | 1914 | $215,000,000 | $163,000,000 | $431,000,000 |
| | 1929 | 430,000,000 | 500,000,000 | 1,363,000,000 |

ELECTRICAL APPARATUS.

| Imports | Year | United Kingdom | United States | All countries |
|---|---|---|---|---|
| | 1928 | $1,700,000 | $17,000,000 | $19,000,000 |
| | 1929 | 1,900,000 | 24,000,000 | 27,000,000 |
| Exports | | | | |
| | 1928 | $292,000 | $98,000 | $1,850,000 |
| | 1929 | 299,000 | 95,000 | 2,400,000 |

The following figures will no doubt be of interest also :—

ELECTRICAL IMPORTS INTO CANADA, 1929.

| | All countries. | United Kingdom. | United States. | U.K. per cent. of total, approx. | U.S. per cent. of total, approx. |
|---|---|---|---|---|---|
| Batteries, storage ... ... | $632,000 | $319,000 | $312,000 | 50.6 | 49.4 |
| Dynamos, generators ... | 1,560,000 | 294,000 | 1,250,000 | 18.7 | 72.0 |
| Incandescent lamps— | | | | | |
| (*a*) Carbon filament ... | 56,000 | 320 | 6,000 | 5.7 | 10.7 |
| (*b*) Metal filament ... | 134 000 | 3,300 | 70,000 | 24.8 | 52.0 |
| Electric lighting fittings ... | 1,103,000 | 19,000 | 1,040,000 | 1.7 | 94.2 |
| Meters... ... ... ... | 408,000 | 41,000 | 365,000 | 10.0 | 89.4 |
| Motors... ... ... ... | 4 310,000 | 548,000 | 3,600,000 | 12.7 | 83.6 |
| Spark plugs, &c. ... ... | 1,109,000 | 15,000 | 1,081,000 | 1.3 | 97.6 |
| Switches, &c. ... ... ... | 1,613,000 | 64,000 | 1,536,000 | 4.0 | 95 3 |
| Telegraph instruments ... | 493,000 | 20,000 | 473,000 | 4.0 | 96.0 |
| Telephone instruments ... | 1,856 000 | 216,000 | 1,640,000 | 11.6 | 88.4 |
| Wireless apparatus ... ... | 5 939,000 | 116,000 | 5,822,000 | 2.0 | 98.0 |
| Others... ... ... ... | 7,570,000 | 272,000 | 7,217,000 | 3.6 | 95.3 |

### The Canadian Electrical Code.

It may perhaps still not be generally known in England that since the Canadian Electrical Code (which is a code of rules governing electrical installation work up to 5,000 volts) was published by the Canadian Engineering Standards Association in 1927, it has been officially adopted in most of the provinces of Canada (*i.e.*, the rules are laws of the provinces with penalties for non-observance) and it is probable that before long it will be the standard for the entire country.

This code requires that all electrical equipment used be " approved " although no attempt is made at present to approve large motors, generators, transformers, &c. " Approval " means that the equipment has been inspected and tested by a recognised laboratory and that it has been officially approved in writing by that laboratory. Pending the establishment of an Approvals Laboratory by the Dominion Government the Code permits electrical inspection departments to accept the approval of either the Underwriters' Laboratories of Chicago or the Hydro-Electric Power Commission of Ontario, which latter body established its own Approvals Laboratory thirteen or fourteen years ago in order to supervise electrical equipment used in Ontario.

The facts that the Canadian Electrical Code requirements have now to be observed practically all over the Dominion, and that the approval of a Canadian laboratory is accepted, tend to make the path of the British electrical manufacturer trying to do business here a little easier than formerly, as neither the Code itself nor the Approvals Laboratory of the Hydro-Electric Power Commission discriminate against British products. It is rather hard for the average person at home who has not been to Canada to realise what it means to try to serve the needs of a small population—less than ten millions—scattered over a territory as large as this. Canada is a land of " magnificent distances," and it must be borne in mind that travelling expenses and freight charges total up to " magnificent " figures. An office or warehouse located in Toronto is 350 miles from Montreal, 1,200 from Winnipeg, 1,700 from Saskatoon and 2,800 from Vancouver.

Not only does Canada import some 20 million dollars' worth of electrical supplies, 90 per cent. of which comes from the United States, but she manufactures electrical equipment valued at about five times that sum (in 1928 nearly 94 million dollars' worth) and most of these home products follow United States' practice with regard to design and standards. So accustomed are the people of Canada to equipment and materials based on United States' practice that British types are hard to introduce; the alternative is for the British manufacturer to copy ths styles prevalent here.

### Prospects of New Business.

In some quarters it is felt that business in Canada will be rather seriously affected for some time to come by the recent stock market conditions in the United States, but the Canadian National Railways have decided to go ahead with their plans without change, and there are indications that the Canadian Pacific Railway will do the same—both of these great organisations will thus spend many millions of dollars in the next few years.

The Beauharnois Power Company, mentioned above, has just announced that $30,000,000 will be spent on its immediate developments. One of the largest banks in Canada estimated, in November, that " on the basis of contracts awarded for work as yet uncompleted, the country has in sight construction totalling $250,000,000 in value as against about $210,000,000 at this time last year." It is stated that of contracts awarded in October over $27,000,000 was accounted for by engineering contracts; much of this is for hydro-electric power development.

In connection with the great expansion in hydro-electric development which is taking place, it must be remembered that the adding of, say, half a million horse-power to the generating capacity means corresponding increases in transforming, transmitting, and distributing capacity and also enormous additions, in the aggregate, to the meters, service equipment, motors, domestic appliances, lamps, etc., which will necessarily have to be supplied. When it is remembered that the annual *per capita* consumption of electricity in Canada is almost double that even of the United States and more than five times that of Great Britain, the demand of this country for equipment such as is indicated above during the next few years will manifestly be stupendous.

### Some Authoritative Opinions.

Readers of the REVIEW may be interested in the following expressions of opinion regarding the subject with which this article deals which have been obtained from various men who have had a considerable amount of experience in this country in trying to sell British electrical products.

> " . . . we have in many instances to contend with a preference for machines made locally. This preference is largely due to the engineers in many plants being familiar with the local product only. A considerable number of the important electrical contracts are placed with firms on this side owing to interlocking interests.
>
> " The fact of British works being farther away occasions a certain amount of nervousness existing on the part of firms who have not previously purchased abroad and is a deciding factor in placing orders in some cases . . . there is reason to think that due to clients' appreciation of the better (British) product—prospects for the British manufacturer will improve."
>
> * * * * *
>
> " There is no question but that there is a very great field indeed for the British manufacturers of electrical appliances of all kinds, provided that they

take care that the goods they endeavour to sell over here are suited to the market, and are able to meet American and Canadian competition from the point of view of price."

* * * * *

"If they (British manufacturers) want to do business here it will be necessary for them to completely change their standards to suit the standards of this country. Electrical goods in this country, especially in the nature of cables, accessories, &c., have all to meet the Chicago Board of Underwriters' requirements and . . . the latter have very successfully tied up the trade in this country to suit U.S.A. standards and British goods cannot be used. We have obtained orders for our standard induction motors, but it has been necessary to manufacture these in accordance with A.I.E.E. requirements, and we do not think there is much hope of British manufacturers of electrical motors selling much of their standard product over here."

* * * * *

"We are selling an English motor and have had very satisfactory results. We find that the Canadian consumers are ready to buy the British made products providing they are as good and a little cheaper than Canadian goods manufactured in Canada."

* * * * *

". . . there is a fairly good opportunity for British manufacturers, but it is necessary to *sell* the apparatus and give prompt service in case of repairs."

* * * * *

". . . there is quite an opening in Canada for British apparatus in the way of electric motors and transformers. In recent years the British electrical manufacturers have been paying more attention to the requirements of the Canadian trade and even bringing their rating on motor equipment more into line with the local product and there certainly is a good market before them if they will pursue a policy of this kind. . . . if the Britisher will realise the potential value of the Canadian requirements there is no doubt that there will be considerable business for him in Canada. Now is the time to realise the situation and to get in on the ground floor. Perhaps it may not be profitable all at once, but, if they believe in building for the future, there is no doubt that any efforts made now will return profitable results in the future development of this market which we believe to be a very great one."

* * * * *

"At the present time I am handling for Canada, electrical motors as made by ———— who have been pleased to alter, where necessary, and to make a motor to suit the Canadian trade. . . . if every manufacturer would do as they have been doing, by making to meet this market, I am sure good business would result."

* * * * *

". . . the prospects for the British trader should be quite attractive in Canada provided the equipment he has to offer is suitable for the market and is properly put before the Canadian purchaser, not only in its presentation for sale but supported by ready replacements and efficient service facilities."

* * * * *

"So much attention has been given by the general public to the question of increased trade with the Mother Country, as a result of widespread publicity of the efforts of leading statesmen and others, that it might be said that never before has the 'atmosphere' been more favourable to the British trader than it is at the present time. To those without experience in the Canadian field the influence of the proximity of the U.S. of America, with its large surplus production, should not be under-rated. In addition the representative of a U.S. manufacturer has advantages that cannot be equalled with facility, or without undue expense, by his British contemporary. The majority of manufacturing establishments in the U.S. are within easy telephone communication, and, as a result accurate information regarding deliveries, progress, prices on special or unusual types of apparatus, &c., can be obtained without delay; in a word a degree of service can be rendered which it is manifestly difficult for a British representative to compete with."

### A Few Guiding Principles.

The authority whose views are quoted above sets forth a number of principles which must be adopted; these are as follows:—

1. The British agent should be one carefully trained in the business of his principals.
2. He should have a thorough knowledge of works capacity, routine, and production.
3. He should have complete information, constantly brought up to date by self-explanatory data sheets, blue-prints, &c.
4. He should have a freedom of action approximating that of a director of his company, at any rate, much greater than that accorded to his confrère in England working under direct orders from his house a short distance away.
5. He should have an attractive office, showrooms, and a full stock of standard lines acceptable to the Canadian purchaser.
6. He should have complete repair facilities.
7. He should have a stock of spare parts.
8. He should have power to advertise generously, have ample printed matter made up of first-class stock and plentifully illustrated with the best "half-tones" obtainable, and his price lists should be in Canadian currency and non-fluctuating.
9. The personality of the agent should be carefully considered, for while the idea of Colonial inferiority is as dead as the dodo, implied superiority, outré mannerisms, even an exaggerated accent are factors which discount, perhaps, real ability. And finally he must be "all things to all men" in the sense that his contacts will be from clever science graduates to the man in overalls quite conscious of the merit of his self-gained knowledge and the confidence reposed in him by his superiors.

These things being accomplished, many difficulties will be smoothed, and the agent heartily welcomed and his goods purchased, for there is a real desire to utilise British material.

### How Canadian Buyers May Help.

The representative of one British firm states that he finds that the majority of (Canadian) purchasers do not look forward sufficiently to allow them to take advantage of the better prices usually quoted by British concerns; when British prices are submitted they are compelled to buy American machinery in order to get the apparatus in time for their requirements. He concludes with the following:—

"If Canadian firms really have an interest in giving business to firms in Great Britain, they will have to revise their methods and arrange to purchase on longer delivery."

The foregoing expressions of opinion have been quoted verbatim and are worth some study in the home country as they are from men who have had years of experience over here. With one or two exceptions, they agree that there is in Canada a splendid potential market, and that there is a tendency to favour British goods, if possible; at the same time, goods must be adapted to the Canadian market and proper facilities for giving repair and replacement service are necessary, and, lastly, that the present is an opportune time for the British electrical trader to make a real effort to do business here.

### The Dominion and Empire Trade.

In conclusion, it may be said that the proposals of Lord Beaverbrook for Empire (Free) Trade have attracted much attention here, and although there is no likelihood of Canada favouring the idea of "free" trade, she is undoubtedly interested in that of Empire trade—this interest having been greatly stimulated by the U.S. proposals for higher tariffs against Canadian merchandise.

There are many people here who would be very glad to see such a determined and concerted effort made by the British electrical manufacturers to place their products definitely on the Canadian market that they would become known and appreciated, and finally oust some of the United States' types and standards. There is a decided tendency in the U.S.A., which is largely followed by Canada, to consider British styles (not workmanship) as less suited to conditions on this side than those styles which have been developed here. It is worthy of note, however, that several pieces of apparatus are now being constructed along British lines which 10, 15 or 20 years ago were laughed at on this continent; *e.g.*, the tumbler switch, the English type of telephone set and truck-type switchgear.

# Telephone Transmission Units.

**The relationship between the units used for transmission measurements in telephone engineering, together with a scale showing in a ready manner the approximate values of quantities measured in one unit in terms of the others.**

By W. H. GRINSTED, A.M.I.E.E., A.C.G.I.

THE replacement some years of the "mile of standard cable" by the "transmission unit" as the unit used for the comparison of the transmission efficiencies of different telephone circuits, or apparatus, has led to a somewhat chaotic state in the telephone world. A great many of the specifications referring to "miles of standard cable" are still in use, as well as a great deal of testing apparatus calibrated in that unit. Moreover, it will be remembered that the "transmission unit" was not acceptable to all administrations and that on the Continent of Europe another unit, the "néper," is in general use. Both these units are officially recognised by the C.C.I. (the International Consultative Committee for Long-distance Communication), which has decided to adopt the term "decibel" for the transmission unit.

The "decibel" is one-tenth of a bel," a similar sub-multiple of the "néper" being in use and known as the "decinéper." Both the "bel" and the "néper" have the advantage over a "mile of standard cable" that they can be defined fundamentally without reference to physical characteristics. The definitions adopted by the C.C.I. are as follows:—

(1) If two powers $P_1$ and $P_2$ are concerned, the number of units, according to the respective systems, is:—

| Naperian system (népers). | Decimal system (bels). |
|---|---|
| $\frac{1}{2} \log_e \frac{P_1}{P_2}$. | $\log_{10} \frac{P_1}{P_2}$. |

(2) If two voltages $v_1$ and $v_2$, or two currents $i_1$ and $i_2$, are concerned, the number of units is:—

| Naperian system (népers). | Decimal system (bels). |
|---|---|
| $1 \log_e \frac{V_1}{V_2}$, or $\log_e \frac{I_1}{I_2}$. | $2 \log_{10} \frac{V_1}{V_2}$ or $2 \log_{10} \frac{I_1}{I_2}$. |

It has been common practice in the past when measuring cross-talk to define the amount ascertained as the ratio of the current in the circuit on which cross-talk is being observed to the current in the inducing circuit, adjustments being made for any difference in the impedances of the circuits. The ratio has been expressed as so many "millionths." Of recent years, however, the practice of expressing amounts of cross-talk in the units used for measuring transmission efficiencies, namely, the "néper" and the "decibel," has grown.

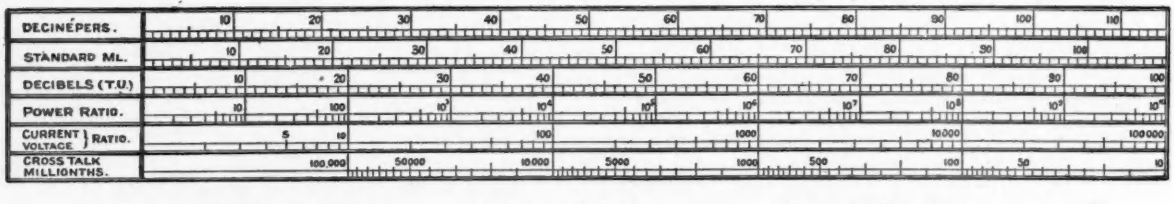


**Fig. 1.—Scale of Relationship between Telephone Transmission Units.**

In the present state of transition brought about by the introduction of these improved practices, some handy means of relating quantities expressed in one unit with corresponding values expressed in other units is badly needed. The relations can, of course, be shown as "curves" on a chart, but such a chart occupies considerable space and is somewhat cumbersome to use.

The scale reproduced on this page (fig. 1) forms a much more compact and convenient means of making an approximate conversion from one unit to another. It is printed on stiff paper and has been issued by Messrs. Siemens Brothers & Co., Limited, London, to whom the author is indebted for permission to publish this explanation.

# Electricity in the Manufacture of Cement.

**Some impressions of a visit to the new cement works at Hope, Derbyshire, of Messrs. G. & T. Earle, Ltd.**

IN the midst of the beautiful hilly country of North Derbyshire is probably the last place where one would expect to find large-scale modern industry, but it is just outside the village of Hope, some twelve miles south-west of Sheffield, that Messrs. G. & T. Earle, Ltd., have established a modern works capable of turning out 3,500 tons of Portland cement per week. The works are very favourably positioned for the manufacture of cement, being situated between and adjoining almost inexhaustible supplies of limestone and clay, which provide the three essential constituents for Portland cement: lime from the limestone and silica and alumina from the clay. From the winning of the raw materials, clay on one side and limestone on the other side of the works, the processes of manufacture commence immediately and continue during the transit of the materials to the central works where they meet and the final stages of manufacture are conducted.

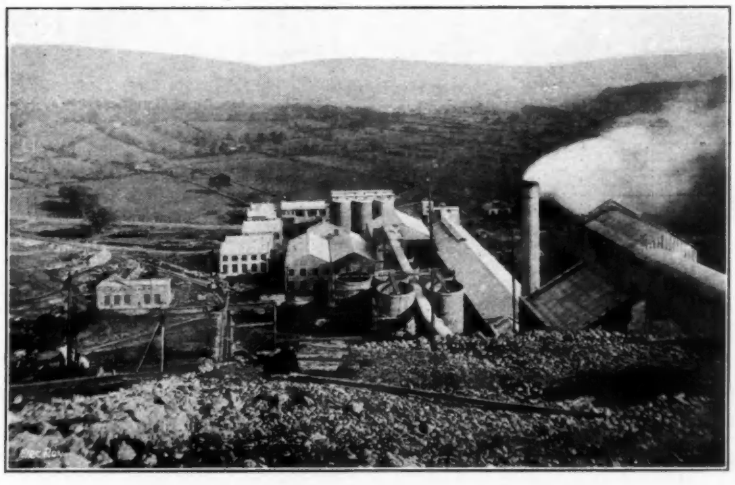

**Fig. 1.—The Hope Portland Cement Works.**

The works, fig. 1, may be described as entirely electric, for, although compressed air is used for certain operations, it is produced electrically, and all the other power requirements are satisfied by means of electricity. The works run continuously, 24 hours a day and 7 days per week, so that the electricity demand is of a very desirable nature and represents a load factor of something like 60 per cent. The average loading for the whole concern is in the neighbourhood of 3,000 kW. A supply to the works is afforded by the Yorkshire Electric Power Co.

It is interesting to note that by the Hope and District Electricity Order the Y.E.P. Co. has recently taken over an area in Derbyshire of some 66 sq. miles, including Hope, Bamford, and Castleton, and that the Order

**Fig. 2.—Concrete Mast; 33-kV Line.**

**Fig. 3.—Leading-in Arrangements at Main Sub-station.**

was inspired by the demand for the projected cement works. Electricity is supplied to the Hope works at 33,000 V by means of duplicate overhead lines running from the Y.E.P. Co.'s outdoor sub-station at Deepcar, which is fed from the 66,000-V triangular link between the supply company's power stations at Ferrybridge, Barugh, and Thornhill. The first sections of the two 33-kV lines from Deepcar follow different routes: one running west of Bradfield and the other east of Oughtibridge. The lines meet at Moscar and then take the same route to Hope. The diverging of the lines at the first part of the route will enable two districts to be served, while there is little but moorland covered by the last section of the route. The lines are of very simple construction. Ordinary 0.08-sq. in. copper conductors are carried by 3-petticoat upright pin-type insulators, and for the last few miles of the route reinforced-concrete masts, made by Messrs. Earle, are employed. These masts, fig. 2, are of "H" girder construction and are 44 ft. high above ground to the top conductor. They are erected directly about 7 ft. 6 in. in the ground, and measure 18 in. by 15 in. at the ground level, tapering to 8 in. by 8 in. at the top. Bird guards are not employed. An earth wire is bracketed to the posts under the line and is earthed to a plate every few hundred yards. Very simple arrangements obtain at the road crossings, and bridle guards are employed only at the main-road crossings. The erection of the line presented considerable difficulties owing to the wild nature of the country, and caterpillar tractors were employed to get the poles to the positions required.

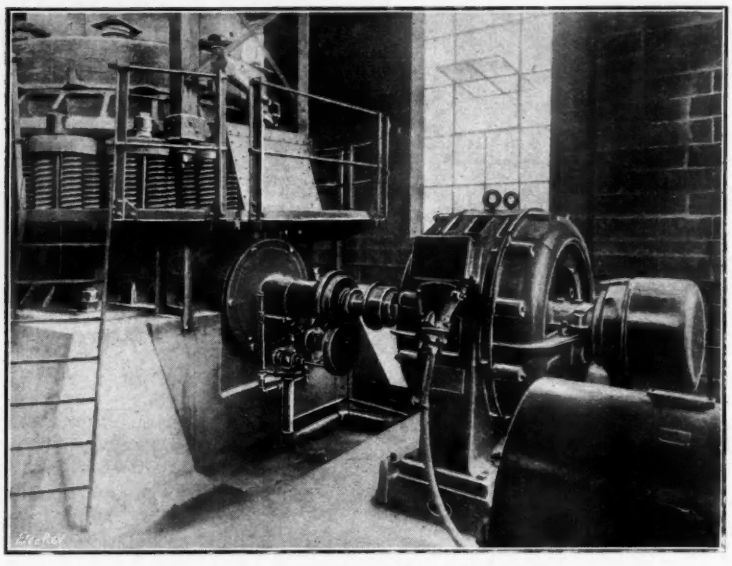

**Fig. 4.—Cone-crusher Driving Equipment.**

The 33-kV supply is stepped down to 3,000 V at the main sub-station A at the Hope works by means of two 3,000-kVA outdoor transformers, by the British Electrical Engineering Co., Ltd., fitted with conservatoir breathers. The transformers are arranged outside a concrete-block (rock faced) building which houses English Electric Co., Ltd., outdoor-type switchgear. The overhead lines are tied, through suitable insulators, to a girder framework on the roof of the sub-station building. Fig. 3 shows the terminating and leading-in arrangements at the sub-station; fig. 7 is a view inside the building, showing the 33-kV bus-bars, switches, and connections; and fig. 9 depicts the sub-station on the transformer side and a portion of the overhead lines. The object of housing the outdoor-type switchgear is to protect it from cement dust.

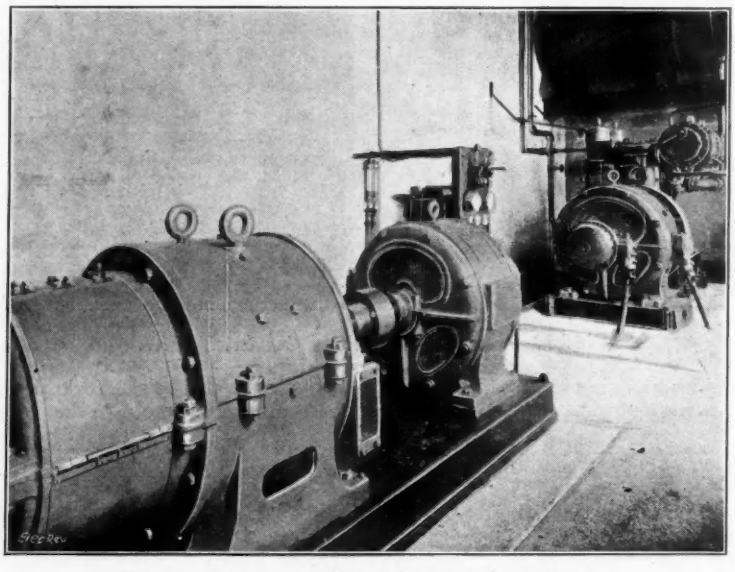

**Fig. 5.—Motor-generator Set in Sub-station C.**

From the 3,000-V side of the main transformers underground cables feed into sub-station B at the central works where is all the necessary switchgear for controlling the supplies to the many and

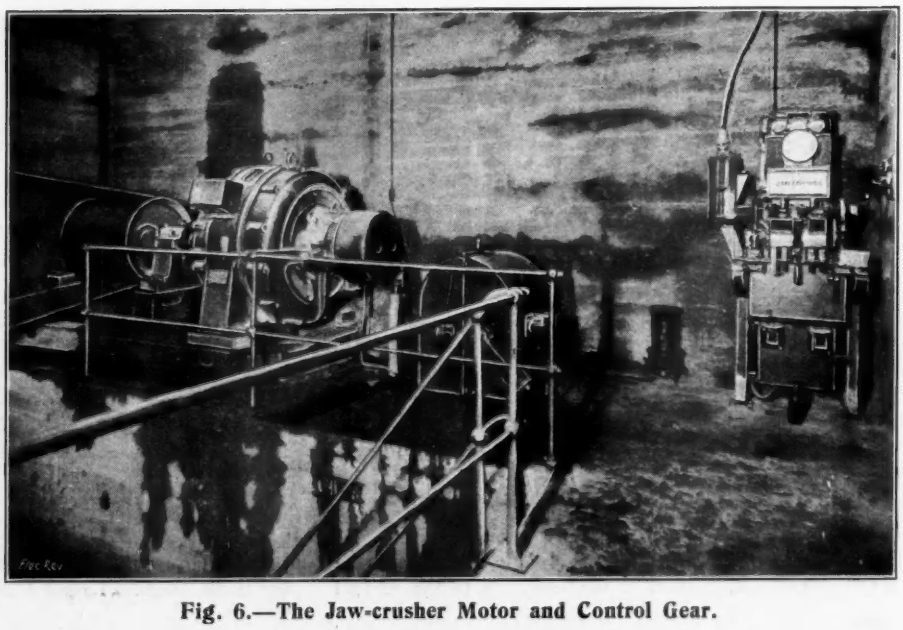

**Fig. 6.—The Jaw-crusher Motor and Control Gear.**

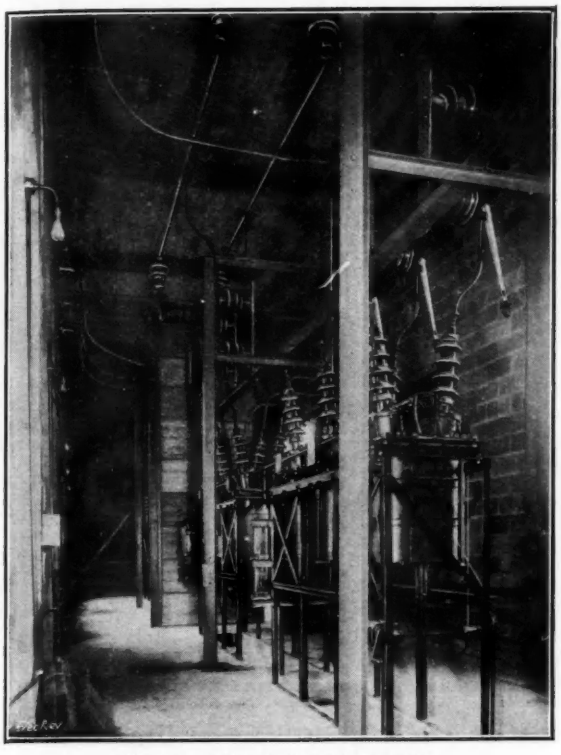

Fig. 7.—Sub-station A, Interior.

various motors throughout the works and to sub-stations C and D, to which reference will be made later. In sub-station B the Y.E.P. Co. has two 1,000-A K1-type metal-clad draw-out switches, by the Metropolitan-Vickers Electrical Co., Ltd. The bus-bars of these switches are in common with the whole of the 3,000-V switchgear supplying the works.

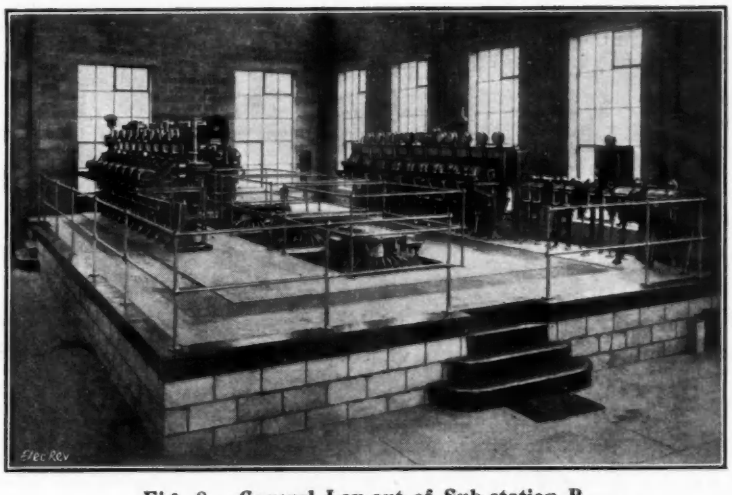

Fig. 8.—General Lay-out of Sub-station B.

There are ten panels on the 3,000-V equipment in this sub-station, manufactured by Messrs. A. Reyrolle & Co., Ltd.

In sub-station B, fig. 8, there are also three 750-kVA transformers in parallel which step-down to 400 V for supplying through G and D type switches by Messrs. Reyrolle & Co. for the l.p. power supply throughout the works. The lighting supply is taken off the end of the 400-V bus-bars to a 300-A circuit breaker by Messrs. George Ellison, Ltd., and the lighting is balanced between the three phases and neutral.

As already indicated, the winning of the necessary raw materials commences at the quarry, which is about 800 ft. above sea level, and the clay field. The power for the quarry is obtained from a 500-kVA, 3,000-V transformer in sub-station C. The rock is removed from the quarry first by drilling and blasting and then by means of an electric navvy. Primary drilling is carried out by means of two electric well drills driven by 20-h.p. slip-ring motors; 40-ft. holes are now drilled, but later drilling to over 100 ft. will be effected. Secondary drilling is carried out by compressed air, for which purpose a vertical compressor driven by a 120-h.p. slip-ring motor is installed. Automatic control for this motor has already proved a great saving, for the machine is "down" half the time at two-minute intervals. The Ruston electric navvy will deal with 120 tons of rock per hour, and is equipped with five motors—one 110-h.p., two 40-h.p., and one 5- and one 2-h.p.—all automatically controlled. The rotor circuits of the 110-h.p. and 40-h.p. motors are governed by "Eddystats," whereby all contacts are eliminated, and should the navvy stall in the rock these motors would not burn out, the "Eddystats" having the advantage that short-circuiting of the rotors cannot take place. The navvy was installed by way of experiment, but up to now no trouble whatever has been experienced. A four-core (one earth) 0.25-sq. in. c.t.s. cable feeds the navvy from five interlocking switches placed along the quarry

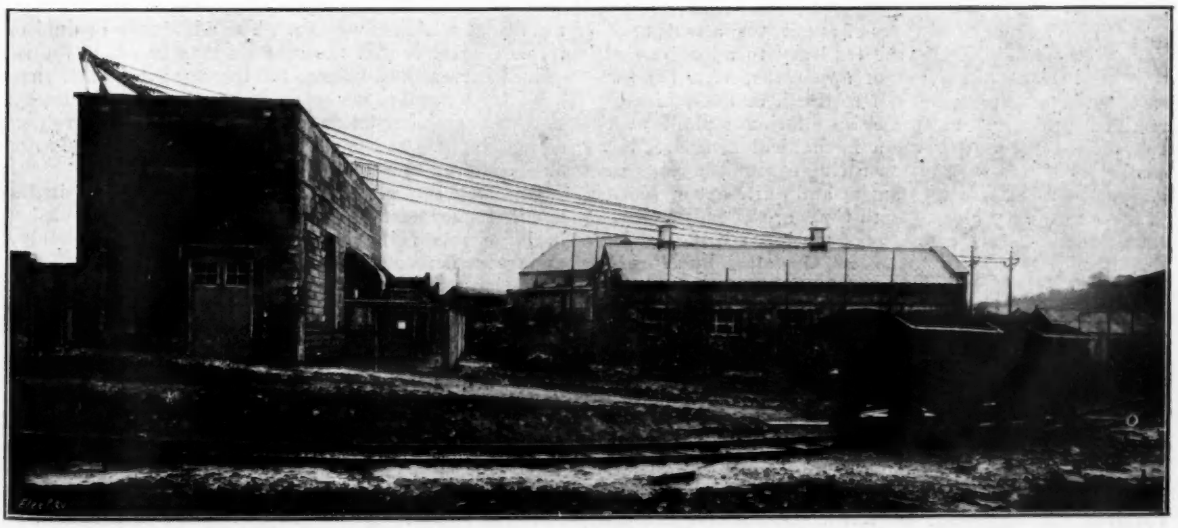

Fig. 9.—Sub-station A, showing Outdoor Transformers, and Portion of Transmission Lines.

face. Fig. 10 shows the electric navvy and the two primary drills at work in the background. The navvy is responsible for heavy peak loads on the electrical installation.

The navvy feeds the rock into trucks which are hauled to a jaw crusher by means of two electric locomotives, supplied by the Metropolitan-Vickers Electrical Co., Ltd., fed from a third-rail system. The locomotives, fig. 11, are each equipped with two 65-h.p., 500-V motors giving at 250 V a maximum tractive effort of 5,000 lb. The third-rail is fed by a 67-kW motor generator set, also by Metropolitan-Vickers, in sub-station C at 250 V, fig. 5. The jaw crusher is claimed to be the largest in the world and is capable of crushing 4-cu. yd. pieces of rock into 6-in. pieces at the rate of 250 tons per hour. It is belt driven by a 250-h.p., 3,000-V motor, 415 r.p.m., and is fitted with a heavy flywheel; the starting torque is exceedingly heavy. Fig. 6 shows the jaw-crusher motor and control equipment, the latter consisting of a liquid starter and Reyrolle metal-clad switchgear.

After leaving the jaw crusher the stone is taken by a 42-in. belt conveyor down the slope of the hill to a cone crusher. This conveyor is driven by a 20-h.p. slip-ring motor through reduction gear. The cone crusher is capable of reducing the stone to $\frac{5}{8}$-in. pieces at the same rate as the jaw crusher. It is driven by a 250-h.p., 3,000-V motor, 415 r.p.m., with similar control to that of the jaw-crusher motor, fig. 4.

*(To be concluded.)*

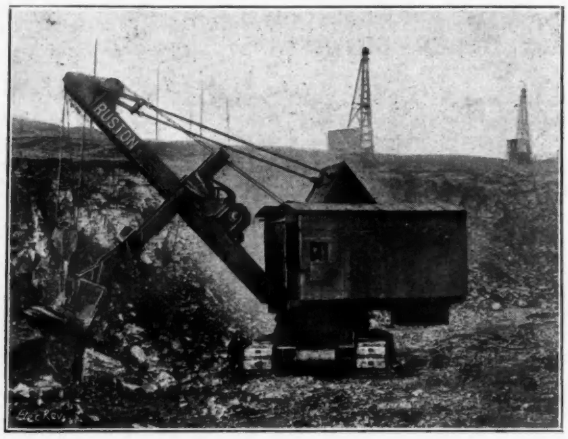


**Fig. 10.—The Electric Navvy and Drills.**

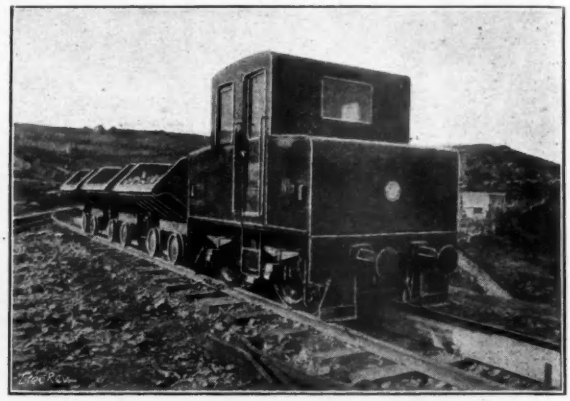

**Fig. 11.—One of the Electric Locomotives.**

# The Radiological Exhibition.

**Finality in design is far from being attained; apparatus is, with some exceptions, being built increasingly on engineering lines; electrical safety is also a noticeable feature.**

By E. H. W. BANNER, M.Sc., A.M.I.E.E., A.Inst.P.

(*Continued from page* 1130.)

APART from novel types of apparatus, a feature of the exhibition is the tendency to adopt one of two distinct types of apparatus, *viz.*, (1) for small sets: a single-valve self rectified, or mechanically rectified set, or (2) for large installations: plant with four or six valves or with a mechanical rectifier, the whole of the high-voltage generating equipment being in a separate room or compartment and quite out of reach of operator and patient. Both types are already well in evidence, two recent examples of the latter being at the Ruchill Fever Hospital, Glasgow, installed by Messrs. Newton & Wright, and at a large Institute at Frankfurt.

Other features now becoming common to all sets include a pre-reading kilovoltmeter, which is a low-voltage instrument connected to the line side of the operating switch in the transformer primary so that the voltage can be selected before switching on. Another general feature is a dual or triple set of controls, so that the plant may be quickly set for either radiography or therapy. Triple controls provide for (*a*) a high-voltage for X-ray screening or visual examination, (*b*) a higher current than is required for screening, by which the patient may be radiographed on a film previously placed in position, and (*c*) a small current for therapy or X-ray treatment, usually at a higher voltage. The advantage of dual or triple control is that the controls may be set to the required current and voltage for therapy; the connections are then changed to screening and finally to radiography, so that on the completion of screening the correct voltage and current for radiography are at once obtainable without re-setting controls.

On small sets all controls are housed directly in the mobile trolley carrying the switch, instruments, &c., but in large sets using heavy mains current engineering apparatus is necessarily much to the fore. One firm uses induction regulators, the regulator being situated near the transformer, and the light control leads only run to the control trolley.

Other means, whose application is increasing, are provided by a relay and a motor-operated selector switch and contactors for both main circuits and selectors.

The last two years have shown a definite improvement in the matter of the electrical earthing of high-voltage apparatus cases and parts hitherto floating but liable to become live and cause accidents. This practice is not universal, but it appears to be tending to this end, so that an electrical engineer who knows nothing of X-ray gear is able to recognise such gear as an engineering job

and not as a physicist's concoction of wires which he would carefully avoid, as has been the case in the past.

A further tendency is in the direction of moving the X-ray tube further from the patient. Six feet (and two metres) are now becoming common; the advantages are better definition of the image, through less distortion owing to the smaller angle of emergent rays, and the increased safety to all concerned. In some installations the patient is placed in a different room from the tube, and in such cases of course safety is practically perfect.

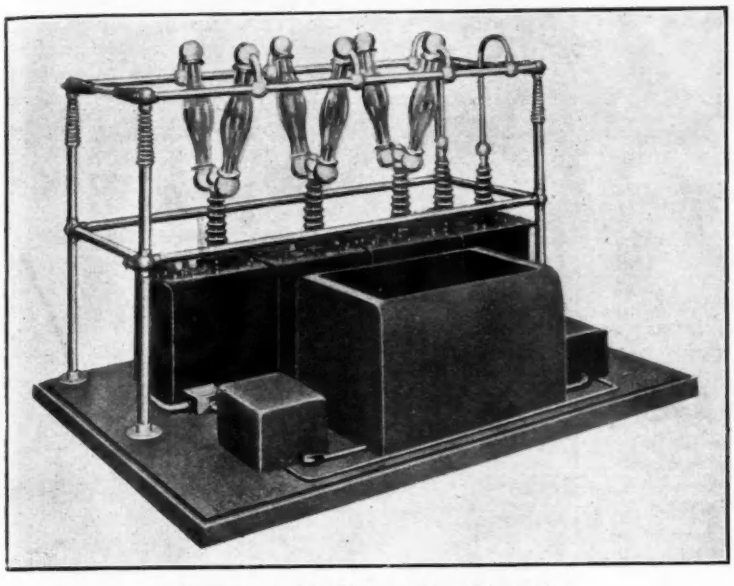

**Fig. 8.—A Six-Valve Three-Phase Set.**

Regarding the exposures now required for radiography, it is interesting to recall that 1/25 second is a common exposure with a camera, and similarly 1/25 second is becoming common for radiography. The great decrease in exposure time (war-time exposures often exceeded three minutes) is due to two reasons: (1) improved apparatus and tubes using much larger currents, and (2) the use of double-coated films and intensifying screens, the combination reducing exposures by about twenty times, apart from the reduction due to the larger currents. Whilst early sets operated with about 3 milliamperes by means of the (gas) tube, modern currents are of the order of a hundred to two hundred milliamperes, so that the above comparison of exposure times can be understood and appreciated.

A low-pressure voltmeter reading in kilovolts across the X-ray tube is now general, but a number of exhibits retain the old practice of measuring voltage approximately by means of a spark gap of which one electrode can be made to approach the other, the distance being read on a scale and the penetration of the tube being referred to as "a six-inch one," &c. These spark gaps are presumably included to satisfy medical users, as no engineer would rely on a point-point spark gap for accurate readings especially as no corrections can be allowed for, and these are considerable. A sphere gap, properly used, is a precision measuring device, and is certainly superior to the point-point or point-plate gap, but it seems to be quite out of place in an X-ray room, and if not in there it has no value to the operator. Few firms set their rectifier filaments by a voltmeter, the scientifically correct way, although some valve manufacturers appear to doubt the veracity of this contention.

For industrial uses only greater power is required, and it may be noted that the development of X-ray tubes for larger powers lags behind the development of the high-voltage generating equipment.

Another feature which appears to retard progress is the fact that each manufacturer provides so many alternative plants. It is admitted that finality has not been reached yet, and that all types should be tried thoroughly before scrapping any, but it does seem as if progress would be better served by concentrating on a measure of mass production, instead of the small numbers of some sets supplied, and also limiting the modifications undertaken to satisfy customers. Customers usually ask for something different from standard, but the experienced manufacturer should know best, in general, and should refuse to modify for a single customer's wish what he has found to be most satisfactory. This again would bring the production of X-ray apparatus still more on to engineering lines.

In addition to the apparatus described last week, the following exhibits were of interest. A horizontal couch set with provision for a tube to be used either above or below, and comprising a self-rectifying tube, was shown by the COX-CAVENDISH ELECTRICAL CO. This is a relatively small and simple set, the transformer being contained in a wooden cabinet together with a wooden trolley-table with an auto-timing switch.

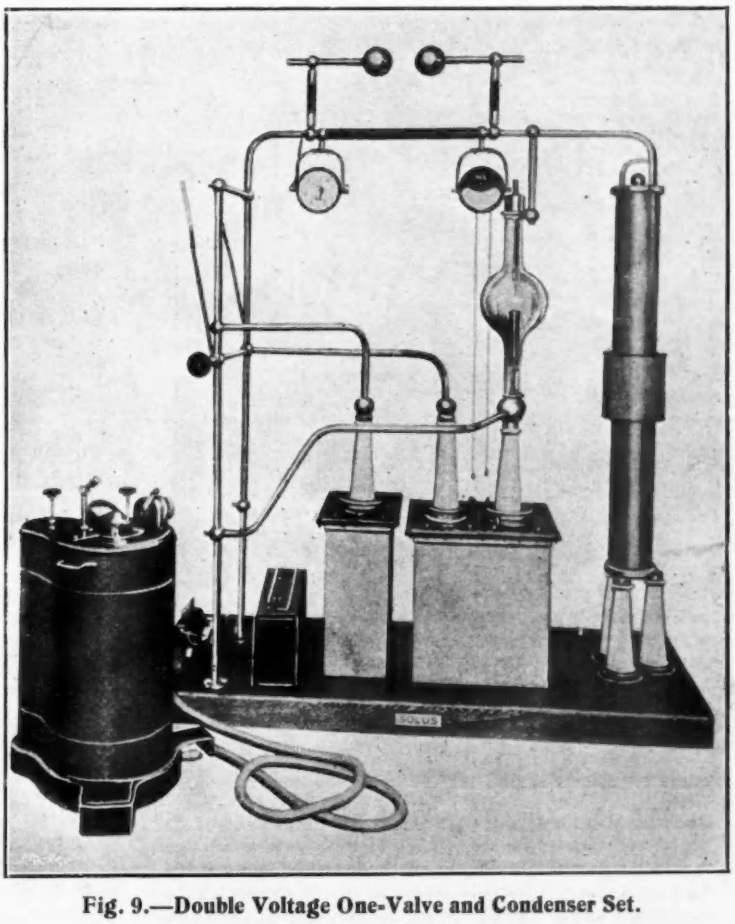

**Fig. 9.—Double Voltage One-Valve and Condenser Set.**

A six-valve three-phase plant exhibited last year by SOLUS ELECTRICAL CO has now been increased in size from 15 kW to 30 kW. Contactors are used for main

controls, and the principal feature is that of great electrical safety of the apparatus exhibited. A tube-holder is completely enclosed in a metal cage, and a transportable unit has a metal cage around its high-voltage leads where they are within reach. A new set includes a one-valve and condenser plant provided with a switch for changing over from radiography at transformer voltage to therapy at twice transformer voltage, by means of the condenser, fig. 9. Dual control is fitted to the mobile control cabinet, and a special milliampere-second relay replaces the stabiliser sometimes fitted. Six-foot screening is also catered for, fig. 11.

The VICTOR X-RAY CORPORATION OF AMERICA showed a novel set in which the whole of the generating equipment and tube were contained in a metal case which could be earthed. This is an extension of its dental set, and appears to have great possibilities. This set was rated at 30 mA, 88 kV peak. The control table incorporates an auto-time switch. Another feature of this firm is the filament stabiliser applied to maintaining the tube filament current constant during the exposure.

A selection of Coolidge tubes made in this country by the BRITISH THOMSON-HOUSTON CO. at Rugby was on show. A screening stand for the oblique as well as the direct examination of patients was also exhibited.

A synchronous timer is a new feature of Messrs. WATSON & SONS (ELECTRO-MEDICAL), LTD. An a.c. motor driven from the mains provides the time base and by setting a dial automatic exposures of from 1/20 second to 10 seconds by intervals of 1/20 second can be made. A filament stabiliser is made also by this firm. All rectifiers are British-made "Osrams." A large six-valve 3-phase set, fig. 8, is a very neat and compact set, the controls being dual and operated from the trolley by a relay and motor-operated selector. A single-valve installation is again the most popular, although all types, including mechanical rectifiers, are made. A couch was exhibited in which the leads to the tube were of the condenser pattern and formed uprights at one end of the couch; as the outside is earthed safety is assured. The pre-reading kilovoltmeter is as usual connected to the transformer primary on the line side and calibrated in secondary kilovolts on load. Most sets are intended for "Metalix" or Muller tubes, but Coolidge tubes can be accommodated. A transportable unit comprising a transformer with tube stand, somewhat similar to several of other makes, formed part of the exhibit.

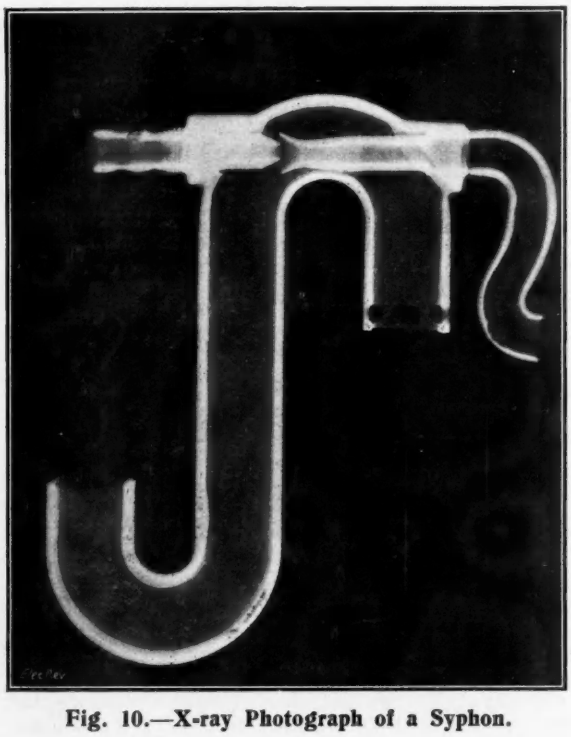

**Fig. 10.—X-ray Photograph of a Syphon.**

Diathermy outfits of several patterns were shown, all embodying tungsten arcs, a number of gaps being in series.

Messrs. KODAK, LTD., WELLINGTON & WARD, ILFORD, and AGFA had stands showing typical radiographs obtained with their films and printing papers; in general the only recent improvements in such materials are in mechanical robustness of films, which are now rather less liable to become scratched, and also give more contrast for showing the maximum detail. Duplitised or double-coated films are now almost exclusively used.

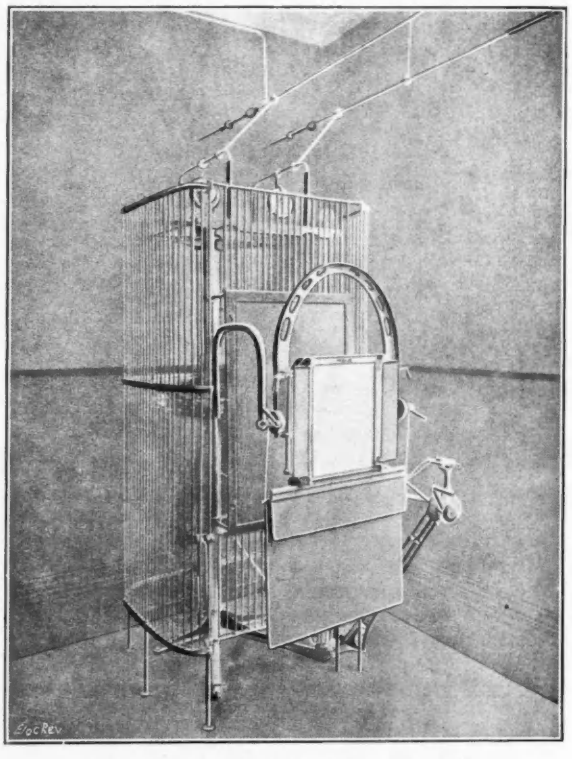

**Fig. 11.—A 6-ft. Protected Screening Plant.**

A Kodak X-ray photograph of a syphon, illustrative of the industrial application of radiography, is reproduced in fig. 10.

### Annual Dinner.

The annual dinner, the third of the new amalgamated British Institute of Radiology, was held at the Trocadero Restaurant on Friday, December 6th, when about one hundred and fifty members and guests were received by the president, Mr. C. Thurstan Holland, D.L., F.R.C.S. The toast of "The Institute" was proposed by Mr. Cuthbert Andrews in a humorous speech.

Replying, the President referred to the exhibition, then just concluded, as the best exhibition held in England, and paid high tribute to British apparatus and also to the high standard of the papers read at the annual meeting.

The toast of "The Guests" was proposed by Major C. E. S. Phillips, with particular reference to Professor Gösta Forssell (President of the Swedish Radiological Institute), Professor A. S. Eddington, F.R.S., Dr. G. W. C. Kaye (past-president), Mr. D. J. Armour (president of the Medical Society of London), and to the editors of the various journals and newspapers who were propagating the progress of radiology in this country.

Professor Eddington, Mr. D. J. Armour, and Dr. Kaye replied, the latter calling for increased support from the rank and file of the profession, and appealed to all radiologists to join and support the Institute.

Finally, after the president had been toasted, Mr. Cuthbert Andrews presented a sketch, in which some rather primitive apparatus was shown, reminiscent of the gear used in some of the hospitals during the early days of the war.

*(To be concluded.)*

# Electricity for the Home.

**The chief engineer of one of the smallest "point five" undertakings discusses in the following article domestic load development, emphasising the importance of load diversity.**

## Developments at Hamilton.

BY W. J. COOPER, A.M.I.E.E.

PROBABLY the most needed reform on the selling side of the electricity supply industry at the present time is the standardisation of methods of charging for supply. It is only necessary to glance over the maze of rates now in force to realise how essential it is that something should be done in this direction. When the Central Electricity Board is in full operation and selling on a uniform method to the undertakings throughout the country, it should be much easier to adopt a uniform method of charging the consumer, but, without an authoritative body to bring about this very much desired change, it is likely to continue to be a slow process of gradual drifting towards a standard. In resuscitating the almost historical "point five" as a secondary rate of a two-part domestic tariff, the ELECTRICAL REVIEW has at least given the undertakings something to hold on to, and if by good luck "point five" were to become a kind of fashion, it would go a long way towards securing uniformity, at least so far as the secondary rate of a domestic tariff is concerned. Every station engineer agrees that "off peak" units can be sold at little more than coal cost, and it is difficult therefore to understand the hesitancy displayed in adopting two-part tariffs with a low secondary rate; particularly is this so in the case of undertakings with large and up-to-date plant where coal costs are usually low. So far as the small station is concerned the adoption of a low secondary rate is more difficult of realisation, unless it is so situated that either a cheap supply of coal or a bulk supply on a two-part tariff with a low secondary rate is available. Small generating stations will, however, soon cease to be, and it is to be hoped that the tariff of the Central Electricity Board, or its nominees, will be so constructed that the distributing authorities can continue, or begin, to supply on two-part tariffs with a secondary rate of "point five." To make this possible the secondary rate of the Board's tariff will have to be of the order of 0.25d. per kWh (high voltage). With the right tariff for bulk supply there seems to be no reason why the small undertaking should not be among the elect. The Hamilton undertaking is so favourably placed for coal supplies that with ordinary reciprocating-engine efficiencies it has maintained for the past four years, with the exception of the period of the coal disturbance, a generating coal cost of 0.2d. per unit, including ash disposal; a bulk supply is also used with a secondary rate of 0.375d. per kWh (high voltage), but this rate is a little too high when "off peak" load is taken on at a secondary rate of 0.5d. Whether it is necessary to come to this figure depends almost entirely on the prices charged for the alternative methods of coal and gas, which in Hamilton are 27s. per ton and 2s. 3½d. per thousand cubic feet, respectively. It would appear that in many districts such a secondary rate will be necessary if electricity is to be used liberally for room heating or water heating at anything like an economic figure.

**Fig. 1.—Demonstration All-electric House at Hamilton.**

Generalisations are dangerous, but it can be stated with some assurance that with few exceptions the small self-contained electricity undertaking, at least in this country, has played its part. Efficient generation and distribution of electrical energy have nothing whatever to do with parochial boundaries.

It is a well established and generally accepted fact that diversity of load is the quickest way to cheap electricity, and, conversely, that cheap electricity supply is the surest way to obtain diversity of load. These elementary facts are, however, so important that they will bear repetition at least once again, and it seems quite clear that the getting of diversity of load is a matter which lies entirely with the undertaking, which must make available a type of tariff to attract suitable loads.

The industry itself can do most to create the economic conditions which it desires, and it seems to the writer quite useless to sit on the fence waiting for diversity of load with tariffs which are obviously quite unsuitable. How far the supply engineer is prepared to go in this direction depends to a great extent on how far he allows his imagination to play a part in making his decisions. He is not dealing with a commodity which changes with the fashion of the hour; the stuff he has to provide is surely by now recognised as a fundamental necessity of any modern community. Because of this he can take big and long views and get an attitude of mind in keeping with the importance of the task which he has to perform. It matters not whether the undertaking is large or small, the objective is the same, although it may be much more easily realised in the large undertaking covering wide areas, and therefore having greater diversity, than in the small undertaking operating in a confined area with little diversity.

There is surely at this late hour no need to discuss the method of charging most likely to encourage extended use. This is already well established as a two-part tariff, and the lower the secondary charge the better.

Nowadays it is not necessary to spend much time preaching the advantages of electricity in the household, since there are few who do not admit them, but in these hard times there are many, especially in the distressed industrial areas, who are compelled to accept the cheapest method, even if it is dirty and unhealthy.

The electricity supply industry will not be fully performing its function until the artisan housewife is relieved of a great part of the drudgery of her existence, and it is suggested that it is from this source that the revenue of the future will come. Of course there are risks which must be taken in the development of " off-peak " load, but after all there are risks in most things that are worth doing. With every batch of good kWh there will in all likelihood be a few bad ones. The already dominating peak of the daily load curve will probably become slightly more peaked, but if it broadens out at its base at a considerably greater rate than it is adding to its height then all will be well. Better still, if the development of " off-peak " load will give birth to a new peak somewhere in the middle of that bleak and uninteresting valley of the load curve reaching from 12 a.m. to 7 a.m., it will be well worth while taking some risk. In any case the electricity supply industry can never know how much diversity of load will help until it gets it, and the way to get it seems to the writer only too evident. If the fundamental nature of "cheap and abundant" supply is admitted, then surely the outlook of a supply authority, whether company owned or municipally owned, should be to provide electrical energy for the greatest number of users for the greatest number of uses at the least possible price. The strictest economist will agree that it is better business to take the profit on the finished article rather than on the tool which is necessary to produce it; particularly is this so in the case of our sea-bound island where the very necessities of life have to be purchased with the goods which we have to sell.

Another aspect, which the supply engineer who meditates occasionally is bound to recognise, is that owing to the methods of assessing electricity undertakings for rating purposes a considerable amount of his surplus falls into the hands of the rate collector, and he has not much chance of encouraging the development of the use of electricity if he places his consumers in the position of having to bear more than their fair share of local rates.

What of the consumer's view of the two-part tariff and of electricity charges in general? It is the experience of the writer, and it is almost certain to be the experience of most supply engineers, that he is first of all amazed at the number of ways of charging for electricity. He is not only amazed, but is frequently very suspicious, and, so far as fixed charges are concerned, he is usually very sceptical. Why this should be so is rather difficult to understand, for as a good citizen of any community he is well trained in the payment of fixed charges, his contribution to roads and bridges, to education, to public health, to parochial relief, &c., are all fixed charges, and fixed charges which have no bearing on the demand he makes upon these services. The public, however, is beginning to realise more clearly this aspect of the problem, and consumers, generally speaking, will be content to pay reasonable fixed charges if they are relieved of the necessity of constantly considering the price of the kWh. This seems to the writer to be the crux of the matter, particularly in so far as a secondary rate for domestic purposes is concerned.

It will be generally admitted that a satisfied extensive electricity user is a very effective propagandist, and in this connection it may be of interest to readers to know that in Hamilton twelve " one-fire " electric houses owned by the Corporation have been equipped for the express purpose of obtaining data for propaganda purposes. Each of these houses is equipped with appliances of one manufacturer for the purpose of obtaining information as to comparative reliability of the apparatus of the different manufacturers. The circuits for lighting, cooking, room heating, water heating, and wash-boiler are all separately metered. In each house is fixed a demand indicator, and, in order to obtain diversity, a demand indicator is fixed in the feeder supplying these houses. The meters are read monthly, and since the houses have been occupied for more than a year, most interesting data are being collected as to the amount which is used for the various purposes, and for what purpose electricity is most desired.

In conclusion, the writer suggests that in this matter it is not all just a question of the present cost of production, but rather a question of how much the public is able to pay for electricity. Having obtained an indication in this direction, it is left to the undertaking to develop sufficient output and sufficient diversity to bring the cost of production within the figure which can be obtained for the commodity which it is the business of the electricity supply industry to provide.

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### A New Cooker Switch.

The " Botrade " cooker switch, a product of Messrs. S. BILL & CO., LTD., Queen's Road, Aston, Birmingham, incorporates the necessary main control for the cooker, together with a fused pilot-lamp circuit and a plug and socket sub-circuit for a kettle. The switch is the " Botrade " quick-make and-break type and is insulated by high-grade bakelite. The contact clips are of high-conductivity phosphor-bronze. The lever is interlocked with the switch cover, so that the switch is automatically in the off position when the cover is opened. The fuses are of the arc-damping type, designed to pass H.O., I.E.E., and B.O.T. Regulations, and are fitted with phosphor-bronze contact clips. There are three standard models of the apparatus. No. C 2,000 embodies a 30-A, 3-pin plug and socket and a 30-A, d.p., q.m. and q.b. switch; No. C 2,005 has a 30-A, d.p., q.m. and q.b. main switch, a 5-A, 3-pin plug and socket, two 10-A s.p. fuses in the plug circuit, a pilot lampholder, and a 5-A s.p. fuse in the pilot circuit; No. C2,010 is similarly equipped to No. C 2,005, but has in addition a 5-A s.p. heavy-duty q.m. and q.b. tumbler switch controlling the plug. Fig. 2 shows the No. C 2,010 model.

**Fig. 2.—A " Botrade " Cooker Switch.**

### Developments in Switzerland.

According to a recent return there were 1,300,000 electric domestic heating appliances in use in Swiss households at the beginning of 1929, the number including 124,000 cookers, 70,000 water heaters, 180,000 small tea, coffee, and water heaters, 600,000 hand irons, and 140,000 fires. The number, which has undergone a further large increase during the past year, represent one electrical apparatus for each three inhabitants of the country.

### Electric Cooking in Adelaide.

The growth of electric cooking in Adelaide is illustrated by the facts (quoted from the *Adelect*) that whereas during 1925 there were five electric stoves with an aggregate loading of 25 kW, and no electric water heaters, connected to the Adelaide Electric Supply Co.'s mains, there were on June 30th, 1929, 196 stoves with a load of 1,000 kW, and 207 water heaters with a total load of 60 kW. During the first half of the year 42 stoves (215 kW) and 58 water heaters (17 kW) were connected.—*Australasian Electrical Times.*

# British Industries Fair.

## A First List of Exhibitors at Birmingham.

THIS year between six and seven hundred firms and individuals will have stands in the Birmingham Section of the British Industries Fair. From this long list we have extracted the following names of exhibitors of goods of an electrical or allied nature. It is possible that there will be additions to the number of electrical exhibitors, in which case their names will appear in a subsequent issue. The names of some of the London exhibitors were given in our issue of December 20th (p. 1097).

Allen-Liversidge, Ltd.
Allen, W. H., Sons & Co., Ltd.
Alpha Electrical Apparatus Co.
Ashdown, H. E. (Birmingham), Ltd.
Avery, W. & T., Ltd.
Bakelite, Ltd.
Belling & Co.
Berkeley & Young, Ltd.
Berry's Electric (1928), Ltd.
Birkbys, Ltd.
Birmingham Electric Furnaces, Ltd.
Birmingham Electric Supply Dept.
Blackstone & Co., Ltd.
Bland Light Syndicate, Ltd.
Bray, George, & Co., Ltd.
British Brass Fittings, Ltd.
British Elect. Development Association.
British Electrical Repairs. Ltd.
British Engineering Standards Association.
British Hanovia Quartz Lamp Co., Ltd.
British Thomson-Houston Co., Ltd.
Brown, S. G., Ltd.
Bull Motors, Ltd.
Bulpitt & Sons, Ltd.
Cambridge Instrument Co., Ltd.
Canning, W., & Co., Ltd.
Catterson-Smith, R. M.
Cellon, Ltd.
Chesterton, Jones & Co., Ltd.
Chloride Electrical Storage Co., Ltd.
Commutator Grinding Block Co.
Credenda Conduits Co., Ltd.
Crossley Bros., Ltd.
Davey, Paxman & Co., Ltd.
Davidson & Co., Ltd.
Davis & Timmins, Ltd.
De La Rue, Thos., & Co., Ltd.
Donovan & Co.
Drayton Regulator & Instrument Co., Ltd.
Earle, Bourne & Co., Ltd.
Eastern Telegraph Co., Ltd.
Electrical Power Engineering Co.
Electrical Power Engineers' Association.
Electric Furnace Co., Ltd.
Ellison, George, Ltd.
Ellmar Mouldings Co.
Ever-Ready Co. (G.B.), Ltd.
Falk, Stadelmann & Co., Ltd.
Fescol, Ltd.
Film Cooling Towers (1925), Ltd.
Foster Instrument Co.
General Electric Co., Ltd.
Gilman, F. (B.S.T.), Ltd.
Hackbridge Electric Construction Co., Ltd.
Harland Engineering Co., Ltd.
Hailwood & Ackroyd, Ltd.
Hawkes, O. C., Ltd.
Highfield Electrical Co.
Holden & Hunt.
Hollings & Guest, Ltd.
India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
Jackson Electric Stove Co., Ltd.
Johnson, Rd., & Nephew, Ltd.
Lighting Trades, Ltd.
Lister, R. A., & Co., Ltd.
Lundberg, A. P., & Sons, Ltd.
McGeoch, Wm., & Co., Ltd.
Metro-Vick Supplies.
Micanite & Insulators Co., Ltd.
Midland Fan Co., Ltd.
Morris, Herbert, Ltd.
National Gas Engine Co., Ltd.
Oldham & Sons, Ltd.
Parks, F., Ltd.
Parsons, C. H., Ltd.
Peters, G. D., & Co., Ltd.
Petters, Ltd.
Pneulec, Ltd.
Premier Electric Welding Co., Ltd.
Pritchett & Gold & E.P.S. Co., Ltd.
Rainsford & Lynes, Ltd.
Rapid Magnetting Machine Co., Ltd.
Rawlplug Co., Ltd.
Ray Engineering Co., Ltd.
Record Electrical Co., Ltd.
Restlight, Ltd.
Revo Electric Co., Ltd.
Reyrolle, A., & Co., Ltd.
Ringsdorff Carbons (England), Ltd.
Ruston & Hornsby, Ltd.
Siluminite Insulator Co., Ltd.
Slingsby, H. C.
Stone, J. B., & Co., Ltd.
Sturge & Baker, Ltd.
Sturtevant Engineering Co., Ltd.
S. W. & S. Power Co., Ltd.
Tangyes, Ltd.
Telegraph Construction and Maintenance Co., Ltd.
Thermo Path Co., Ltd.
Thomas, Bertram.
Tympany & Tyler, Ltd.
Tucker, J. H., & Co. Ltd.
Turner Bros. Asbestos Co., Ltd.
Turner, Stuart, Ltd.
Vac-Tric, Ltd.
Vitalite Co., Ltd.
Vivian, H. H., & Co., Ltd.
Wardle Engineering Co., Ltd.
Wiggin, Henry, & Co., Ltd.
Wolseley Sheep Shearing Machine Co., Ltd.
Young, Osmond & Young, Ltd.

### Visits and Conferences.

Mr. E. J. Jennings, the honorary secretary of the Electrical Section, has sent us the following list of functions which are to be held in connection with the official visits of a number of electrical and allied associations during the run of the Fair:

THURSDAY, FEBRUARY 20TH.

*Luncheon.*
Institution of Electrical Engineers.
Incorporated Municipal Electrical Association.
British Electrical Development Association.
Incorporated Association of Electric Power Companies.
Provincial Electric Supply Association.
Municipal Tramways & Transport Association.
Tramways & Light Railways Association.

*Conference.*
British Electrical Development Association (morning).

SATURDAY, FEBRUARY 22ND.

*Luncheon.*
Electrical Power Engineers' Association, and Conference in the afternoon.

*Tea.*
Students' Section, South Midland Centre,
Institution of Electrical Engineers.

THURSDAY, FEBRUARY 27TH.

*Luncheon.*
Institution of Electrical Engineers (South Midland Centre).
Association of Consulting Engineers.
Association of Supervising Electrical Engineers.
Electrical Contractors' Association.
Electrical Contractors' Association of Scotland.
Electrical Wholesalers' Federation.
Electrical Merchants & Manufacturers' Association.
Association of Mining Electrical Engineers.
Illuminating Engineering Society.

*Conference.*
Electrical Contractors' Association (morning).
Electrical Wholesalers' Federation (morning).

*Tea.*
Electrical Association for Women (Birmingham & Midland Branch).

# Reviews.

**High-Voltage Cables,** by L. EMANUELI. Pp. vi+107; figs. 81. London: Chapman & Hall, Ltd. Price 8s. 6d. net.

Mr. Emanueli gave recently a course of five lectures at the University of London. These he has now published in book form. As stated in the preface, written by Professor Fortescue, the book touches upon all aspects of the recent developments of high-voltage electric cables.

The first lecture is headed "Introduction," though after the first five pages (in which a most elementary description of cable construction is given) it is devoted to a technical description of the various sorts of paper and the methods usually applied to ascertain the electrical and mechanical properties of paper, the second lecture describes the characteristics of different impregnating oils, and the methods of testing same. The latter part of this lecture is devoted to the consideration of paper and compound combined in the form of impregnated paper. The "Electrostatic Field" is the subject of the third lecture, and this is considered both from a mathematical and experimental point of view. The fourth lecture deals with the impregnation of cables, and commercial methods of impregnation and the effect of thermal expansion are described. The whole subject culminates in the fifth lecture, where the mechanical and electrical properties of the finished cables are considered, and theories for breakdown and cable deterioration are dealt with. At the end of this chapter a brief description is given of the single core, 132,000-volt cables which have been working in the United States for the past two years.

A book written by Mr. Emanueli cannot fail to be read with interest, but we cannot help feeling that he has endeavoured to compress too much into a book of 107 pages gross, which is reduced to 91 net, since 16 pages can only be of interest to the Bellman in Carroll's "Hunting of the Snark." At the commencement of the first lecture, the author states that he has two alternatives, *i.e.*, to endeavour to say something about all the many points of interest the subject presents, or to select one and deal with this thoroughly. He states that he has adopted the latter alternative, but we are left wondering which was the actual point he has dealt with so thoroughly. It appears to us that any one of the subjects mentioned in our brief summary deserves at least 91 pages to itself.

Several interesting curves are provided, but some of these are reproduced on so small a scale as to require a microscope,

*e.g.*, fig. 66 on page 78. The numerous illustrations in the book might have been better chosen; a reader whose knowledge of cable making is so limited that he has to be told that "the paper which is cut into strips is lapped round the conductor by means of machines such as those shown in fig. 1," will hardly be able to gather much useful information from that figure. We also think it a pity that a bibliography is not attached to assist the reader to a further study of the subject.

There is, however, much in the book which will interest the cable engineer.

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**Proceedings of the International Congress on Illumination, 1928.** Pp. xiii+1,443; illustrated. New York: International Congress on Illumination. Price $10.

These proceedings combine in one volume an extremely valuable collection of original papers on the many aspects of lighting, and contain in essence a summary of the progress made in the technique of lighting during recent years; as such they will be used as an important work of reference by anyone seriously engaged in any phase of illumination.

The volume contains the proceedings of the Seventh Plenary Session of the International Commission on Illumination and selected papers from the Twenty-Second Annual Convention of the Illuminating Engineering Society. The former necessarily deal with important technical desiderata, and the records of the discussions and the resolutions adopted do much to clarify thought on the specific problems.

The proceedings contain a number of papers dealing with street lighting, glare, traffic control signals, and motor-car headlights, and one is impressed with the number of important resolutions brought forward by the English delegates for consideration by the Commission.

A further section deals with the problem of the illumination of buildings by natural light, and H.M. Office of Works and the N.P.L. contribute a paper dealing with the fading of paintings due to ultra-violet rays, and proposing that filters be used in museums and art galleries when natural light is used, or that corrected artificial daylight should be employed.

Another section deals with factory and school lighting, and among other matters discusses the assessment of glare.

In the resolutions which were adopted, arrangements were made for the national committees to undertake specific studies on illumination for the preparation of papers and reports at the I.C.I. Conference in Great Britain in 1931, and recommendations are made as to the nature of these studies and the appointment of national secretariats.

The later part of the book contains some of the Convention papers and deals with such general matters as the development of modern art lighting in Europe, European lighting problems, electric lighting development activities in Europe, and spectacular and exposition lighting, the latter being accompanied by a number of beautiful coloured illustrations.

Among the more important resolutions which were adopted at Saranac Inn are proposals for a standard terminology and an international system of units based on the C.G.S. system. For instance, the Lux is proposed as the primary unit for ultimate standardisation, but, fortunately for those in English speaking countries, it was agreed that the usual units should be employed giving the C.G.S. values in brackets, and this matter is now obtaining the consideration of the British National Committee on Illumination.

One of the most interesting recommendations was that concerning glare, inasmuch that the sub-committee on this subject was asked to produce a definition of glare which can be accepted internationally. This is a simple recommendation, but a study of the references to glare given in the proceedings indicates how difficult and intangible is the problem to be solved.

One is glad also to note the recommendation that the old minimum illumination intensity values shall be brought up-to-date and reconciled with modern tendencies, bearing in mind welfare and the economic situation. It is proposed that the readings of illumination shall be taken at that point on the working plane where the illumination is least. This resolution partially meets the modern view that sufficient illumination must be provided to enable the eye to carry on its work with efficiency and ease, instead of the older view as to what values shall be considered as a minima to avoid the likelihood of eyestrain and inefficiency.

The Proceedings contain a mine of information, the wealth of which can only be assessed by slow and careful reading, while its presentation with summaries of each paper in three languages constitutes an achievement of which the Executive Committee directing its publication might well be proud.

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**Radio Traffic Manual and Operating Regulations.** By RUDOLF L. DUNCAN and CHARLES E. DREW. Pp. ix+187; illustrated. London: Chapman and Hall, Ltd. Price 10s. net.

This book gives in detail the commercial radio operating practice of the Radiomarine Corporation of America. This matter occupies half of the book, the other half being devoted to the text of the International Radio-telegraph Convention, and Acts and Regulations governing the operation of marine radio-telegraphy in the United States.

The book is written with the object of assisting those who contemplate entering the profession of sea-going wireless operator in the United States, and for this purpose it should prove of value.

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**A Text Book of Illumination.** By W. KUNERTH, Ph.D. Pp. x+269, figs. 120. London: Chapman & Hall, Ltd. Price 15s. net.

In the author's words "this book has been designed as a text in illumination for undergraduate students." The ground covered is very wide, embracing as it does a treatment of the characteristics of light sources, a description of the instruments and methods used in photometry, and of the principal standards of light, chapters on brightness and glare, on the behaviour of the eye, and on all the principal types of illumination installation, such as street lighting, residence lighting, industrial lighting, and the lighting of public buildings. Each chapter concludes with a set of problems on the subject of the chapter and a list of references. It is regrettable that over 90 per cent. of the latter are to American literature. The author states in his preface that he "has availed himself freely of the technical Press, especially the *Transactions* of the Illuminating Engineering Society, and the Bulletins of the Edison Lamp Company. He has also consulted freely other writings of experts in illumination." The impression left on the reader's mind is that nearly all the "experts" are to be found on the other side of the Atlantic. This habit of mind, only too common in a certain class of American technical writers, had led Professor Kunerth into some glaring errors. For instance, in his description of the Weber illumination photometer (p. 89) he makes the astonishing statement that "the standard light source in Europe is a benzene flame, but in this country a small electric lamp is being substituted." He may, perhaps, be interested to learn that the electric lamp has been exclusively fitted to this photometer by the makers for many years. After this it is no surprise to find all the credit for the electric incandescent lamp ascribed to Edison: Swan's name receives no mention whatever. Among the point-to-point methods of measuring mean spherical candle-power, too, the Russell angle method, which is, perhaps, the most convenient of all, is omitted. As usual in American books on the subject, no description is given of the chief European illumination photometers, *viz.*, the Lumeter, Luxometer, Lightmeter, and Bechstein photometer.

There are other serious defects to which attention may be drawn. For example, the treatment of the effect of atmospheric pressure and humidity on the candle-power of flame standards is very vague and even misleading. The inadequacy of the chapter on Daylight is scarcely atoned for by the quotation of a stanza headed "The Psalm of the Sun." The detailed explanation of the way in which a geometrical progression may be summed to infinity (p. 98) seems hardly necessary for engineering students.

There are one or two original touches which are worth quotation. On p. 174, for instance, we learn that "In the British Army red uniforms were used to produce excitement in the ranks of their enemy," while on p. 116 there is a paragraph headed "Effect of a Reflector upon the Life of a Lamp," which reads as follows: "When a beam of light is reflected from any surface whatsoever and becomes incident upon the filament where it is absorbed, the resultant effect upon the filament is an increase in its temperature. If the lamp is already burning at its normal voltage, this increase in temperature will have the effect of running it at an overvoltage and hence shorten the life of the lamp. The luminaire and the frosted bulb are illustrations of this." Finally, it would be interesting to have a psychologist's comments on the author's treatment of the Weber-Fechner law (pp. 105-106), which may be quoted as follows: "If the logs of the stimuli are plotted as abscissæ and the sensations as ordinates, a straight line is produced. When the stimulus is changed from 10 to 100, the sensation is changed from 1 to 2. Hence, when a 100-watt lamp replaces a 40-watt lamp, the lighting will increase to 250 per cent. and the foot-candle intensity increases likewise to 250 per cent. of what it was; but the sensation increases only to 125 per cent. of what it was, for log 100/log 40=2/1.6=1.25."

A very valuable part of the book is the final chapter entitled "Laboratory Manual." This occupies some 18 pages and contains directions for carrying out twenty-four laboratory experiments in illuminating engineering. These experiments are stated to have been used at the Iowa State College for some time, and they certainly appear to be very practical and to cover the field very well. As a slight improvement it might be suggested that the use of the substitution method in bench photometry is generally preferable to double measurement with reversal of the photometer head.

It is unfortunate that so much of this review has necessarily been devoted to pointing out the imperfections of the book, because there can be no doubt that a college text book on illumination is an urgent necessity. We hope one day to see such a text book produced in this country: perhaps the National Illumination Committee and the Illuminating Engineering Society may be persuaded to take up this matter, which is of vital importance to the progress of sound illuminating engineering practice.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.**

## The Interchange of Information.

In the Christmas number of the "M. & C. Apprentices' Magazine," Mr. Sam Mavor writes on "Interchange of Information on Office and Workshop Organisation and Technique." In this article Mr. Mavor suggests that the amalgamation of firms under "rationalisation" schemes may lead to their being loaded with a heavy financial handicap. On the other hand, many benefits of rationalisation are obtainable by co-operation between individual firms while they remain separate organisations. It is not suggested that a firm should broadcast to its competitors the fruits of its own special researches and experiments, but there are numerous details of organisation and general workshop practice in which each firm has something to teach the others. Mr. Mavor assumes a group of ten firms, each of which excels in one branch, and points out that each, while giving information on one point, receives ideas from the other nine. He states that for a number of years Messrs. Mavor & Coulson, Ltd., have been members of such a group of engineering firms. The principals of these concerns meet periodically at the works of each in turn. Then the representative of the firm acting as host describes his organisation, and explains in detail any branches of technique in office or works in which he believes a high standard has been reached. A discussion follows, and on the following day an inspection is made of the works. Since 1918 the company has arranged the exchanging of visits by foremen with leading engineering firms all over the country, and visits to the Continent have also taken place frequently. "These visits enable us to refer our own practice to the scales of efficiency established elsewhere, and give us standards of comparison for new achievement."

## Royal Society of Arts Lectures.

We have received from the Royal Society of Arts its programme of meetings for the first quarter of 1930. Among them we note the following lectures which are likely to prove of interest to our readers:—

January 10th: "The Economic Progress of India," by Sir Basil P. Blackett, K.C.B.; February 5th: "Some Aspects of the Question of Trade with South America," by Sir William Clare Lees, O.B.E. (member of the recent British Economic Mission to South America); March 25th: "The Work of the British Association in Relation to the Empire," by Mr. O. J. R. Howarth, O.B.E., secretary of the British Association for the Advancement of Science.

## Wages in the Cable-making Industry.

The Joint Industrial Council for the Electrical Cable-Making Industry states that there will be no "cost of living" variation in wages in the industry on the third pay-day in January.

## Unemployment.

There was a decrease of 5,904 in the number of persons on the registers of Employment Exchanges in Great Britain during the week ended December 11th. At that date the total was 1,303,600, as compared with 1,309,504 on December 9th, and 1,271,122 on December 17th, 1928.

## A French Manufacturer on Copper Prices.

At the recent annual meeting of the Compagnie Générale d'Electricité in Paris, the chairman spoke at considerable length on the position of the copper market and the serious effect of the high price on the cost of their productions. In view of the fact that the price of copper was largely fixed by America, he considered that it was the duty of electrical engineers in France to utilise as far as possible aluminium—which can be produced in France—instead of copper. He also urged that more attention should be devoted to the development of the copper resources of French Africa.

## Telephone Apparatus Manufacture in Germany.

An accentuation of competition in the manufacture of telephone apparatus in Germany is foreshadowed by the formation of the Standard Electricity Company (S.E.G.) with a share capital of 25,000,000 marks as a German company. The promoters include the International Standard Electric Corporation, the Berlin A.E.G., and the Felten and Guilleaume Company. The S.E.G. is a holding company, and it owns the majority of the shares in the Ferdinand Schuchhardt Company, the Berlin Telephone and Telegraph Works Company, and the Mix and Genest Company; and negotiations are said to be pending for the inclusion of other producing firms.

## Canadian Cookers for Ireland.

Mr. Alan Williams, M.I.E.E., 15, Victoria Street, S.W.1, informs us that his principals, Messrs. Moffats, Ltd., Weston, Ontario, Canada, have recently shipped to the order of the Electricity Supply Board, Dublin, a consignment consisting of 133 electric ranges, 31 of which are of the cabinet type.

## "Buy British Goods."

The Minister of Health has circularised local authorities and other public bodies urging upon them the necessity of purchasing British goods wherever possible, even if the requirements cannot be fulfilled exactly. If it is necessary to make purchases abroad, preference should be given to goods and materials of Imperial origin. Authorities are reminded that Exchequer grants are contingent upon the use of British products, unless special sanction is obtained, but the Minister desires to see this practice extended to all works whether the subject of Government assistance or not.

## The U.S. Trade Outlook for 1930.

The Harvard Economic Society, as quoted by the New York correspondent of the *Financial Times*, expects a continuation of the general trade recession but not depression. It says:—

"During the next two months, with business quiet, profits diminishing, and news reports reflecting business recession, sentiment may be less favourable and a sustained improvement in the Stock Market may have to await better news. The economic effects of the decline in stock prices are not yet spent and two or three months of slack business lie ahead. With the spirit of caution widely prevalent, and with manufacturers, wholesalers, and retailers all attempting to restrict inventories, hesitation in buying and curtailment of output will, naturally, continue. The losses sustained in stocks, and the reduction in employment, will continue to affect purchasing power. Moreover, seasonal influences will act as a drag upon activity, since the winter months are normally the lowest of the year in manufacturing, wholesale trade, construction, and freight movement. In some directions recession may soon come to an end, if only because the contraction has already been so drastic. Manufacturing output, for example, has already dropped far more sharply than in 1923, and in much less time. Reviewing these facts, it must be concluded that neither the optimistic opinion expressed in some quarters nor the alarm of those who look solely to the Stock Market or to basic industry is justified. The forecast is justified of a recovery in business next spring, with a further improvement in the fall, so that 1930, as a whole, should prove at least a fairly good year."

## Baltic States' Foreign Electrical Trade.

According to the *Board of Trade Journal*, during October last "electric machines, apparatus and implements" valued at 244,800 kr. (£13,450) were imported into Estonia. Exports of the same class had a value of 20,800 kr. (£1,100).

In the first ten months of last year Latvia's imports of electrical apparatus were valued at 5,196,000 lats (£205,000).

Polish imports of "conductors, apparatus and other electro-technical materials" during October had a value of 8,814,000 zloty (£202,600), and exports of this class were valued at 118,000 zloty (£2,700).

## Radio Week.

With the support of the British Broadcasting Corporation, the Radio Manufacturers' Association and other bodies, a Radio Week is to be held throughout the country from January 12th to 17th. All radio traders are being urged to make special displays during the week, for which special programmes are being arranged.

## The Singapore Trade Commissioner.

The Department of Overseas Trade announces that Mr. R. Boulter, C.M.G., has now taken up his duties as Trade Commissioner at Singapore. His address is Fullerton Buildings, Singapore.

### The Next Census of Production.

The Board of Trade has made an Order under the Census of Production Acts directing that a census shall be taken in the year 1931, in respect of production in the year 1930. The Order is being published within the next few days. The new census will be the fourth to be taken since the passing of the Census of Production Act, 1906. The first and second related to production in the years 1907 and 1912, respectively; and the third (after the interruption due to the war, and the disturbed conditions arising therefrom), was taken in 1925, in respect of production in 1924.

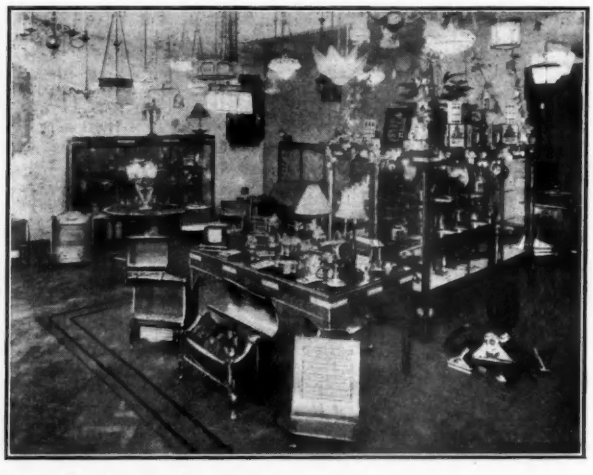
### Social Events.

The annual staff dinner-dance of the Yorkshire Electric Power Co., was held at Powolny's Rooms, Leeds, on December 20th. Mr. W. B. Woodhouse (engineer and manager) and Mrs. Woodhouse were host and hostess and the attendance numbered 120. Dinner was followed by a concert to which the following contributed:—Mrs. Greenwood, Mr. Newton, Mr. Hughes and Mr. Queen, and later in the evening exhibition dances were given by Mrs. Stubbings. The festive spirit prevailed and the function was a success in every way.

Seventy members of the Blackpool Electrical Association attended a recent dinner organised by Mr. R. Barton (president) and the committee. The toast of the Association was proposed by Mr. Charles Furness, the borough electrical engineer, Mr. H. Hazel, vice-president, responding. Mr. W. A. Shaw proposed the health of "The Visitors," including the Mayor (Councillor C. W. Gath).

### New Municipal Showrooms and Offices.

Reference was made in our last issue to the inauguration of new electricity showrooms and offices by the Heston and Isleworth Urban District Council. The accompanying illustrations show the general lay-out of the interior of the showroom and one of the windows, in which some of the domestic appliances of the General Electric Co., Ltd., are displayed.



The Heston and Isleworth Council's New Showrooms.

### Swedish Interests in Finland.

The Allmänna Svenska Elektriska A.B. recently acquired a block of shares in the Finnish electrical company of Gottfrid Stromberg. In a communication issued by the latter it is stated that the company has been informed that a substantial part of its shares has been taken over by the Swedish company without, however, the A.S.E.A. obtaining absolute control. Now the A.S.E.A. states that the shares were purchased in the hope of forming a friendly connection between the two undertakings.

### Fire at G.E.C. Works.

The GENERAL ELECTRIC CO., LTD., states that the fire which broke out in the Moulded Insulation Works, Witton, Birmingham, on the morning of December 30th was of quite a minor character, and will only involve a relatively small number of employés being out of work for a few days.

### The F.B.I. and Australian Tariff Policy.

The following resolution has been passed by the Overseas Committee of the Federation of British Industries:—"The Overseas Committee note with profound regret the recent heavy increases in the Australian Tariff, which will have a twofold adverse effect upon the reciprocal trade between Great Britain and Australia, which is so important to both parties: first, by impeding the sale of British goods in Australia to the detriment of the British manufacturer, and with the further effect of rendering this country less capable of purchasing Australian products; and secondly, by still further increasing the economic difficulties of Australia, thus rendering it more difficult for her to obtain as freely as in the past the necessary financial means for her development. The Committee consider, moreover, that the resulting conditions in Australia, namely, high cost of living, difficulties in finance and high production costs, will in future discourage British manufacturers from establishing industries in the Commonwealth."

### Uruguayan Duty on Batteries.

The Uruguayan "Diario Oficial" of November 20th contains a Decree, dated November 11th, which imposes an additional duty of 40 cts. per kg., supplementary to the existing duties and surtaxes, on electric batteries and cells and all spare parts and accessories thereof imported into Uruguay. The additional duty is not, however, to be applied if the national industry increases the existing prices of such goods without the permission of the National Council.—*Board of Trade Journal.*

### Dutch Radio Apparatus Exports.

The exports of radio apparatus and accessories from Holland declined from 1,175 tons, of the value of 8,863,000 fl., in October, to 1,001 tons value 6,797,000 fl, in November. For the first eleven months of 1929 the figures are 9,561 tons and 74,764,000 fl, as compared with 3,463 tons valued at 19,392,000 fl. in 1928. The exports of metal-filament lamps also declined in November as compared with the previous month. For the eleven months the quantity exported is returned at 56,283,400 of the value of 25,952,000 fl., as compared with 62,071,400 valued at 21,435,000 fl. in 1928.

### Browett, Lindley Reconstruction.

We are informed that the old-established concern, Messrs. Browett, Lindley & Co., Ltd., Sandon Works, Patricroft, Manchester, which has been in a Receiver's hands on behalf of the debenture bond holders, is to be reconstructed early in the new year. The scheme of reconstruction is already well in hand and will be made public shortly. We understand that the company is developing a full range of oil engines, both of the two-cycle and four-cycle types, also its enclosed forced-lubrication steam and gas engines, reciprocating air compressors and condensing plants. The company reports a very satisfactory order book at the present time.

### New French Companies.

Among the companies recently formed in France are the Société d'Electricité des Mines de Prades, organised at Aubenas (Ardèche), with a capital of 1½ million francs, to establish a steam-operated power station at Lalevade d'Ardèche; La Société Parisienne d'Installation de Lumière et de Force Electrique, Paris (8 Rue Cannebière), capital 100,000 fr.; and La Société Alsacienne de Galvanisation Moderne le Chrome, Meuderf-Strasburg, 700,000 fr.

### European Electrical Finance.

At the recent meeting in Brussels of the Société Financière de Transports et d'Entreprises Industrielles ("Sofina"), a shareholder referred to a statement made by the chairman (M. Heineman) that the funds at the disposition of the company, apart from those on deposit with the subsidiary companies, by far exceeded the total of 1,000,000,000 fr.; he asked what purpose was to be served by this great accumulation of money, and what plan was being followed. In reply M. Heineman is reported to have referred to the development of electricity supply in the United States, which was almost entirely effected by private enterprise, and he ventured to suggest that corresponding progress might be expected in Europe. The capital required for the purpose would be very considerable, and those companies who had displayed the wisdom of accumulating funds would logically play an important part in the development of the electricity companies on the Continent of Europe, particularly when through their organisation they were up-to-date technically.

## Bankruptcy Proceedings.

E. J. LANCELOT, merchant, Old Trinity House, Water Lane, E.C.—The public examination of this debtor was held on December 20th at the London Bankruptcy Court before Mr. Registrar Warmington, the accounts showing one liability of £192 and assets of £40. The debtor stated that in January, 1926, with £65 capital, he began business as a dealer in electric batteries at his private residence. Shortly afterwards, with a view to developing the business, he entered into a verbal arrangement with a firm (now bankrupt), to which for consideration of financial assistance, he agreed to pay 50 per cent. of his profits. He attributed his failure to his liability under a judgment obtained against him relating to a disputed claim for money advanced. The examination was concluded.

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WILLIAMS & GILL, 1, Station Road, Church End, Finchley, Middlesex.—The following are creditors in this recent failure :—

| | £ | | £ |
|---|---|---|---|
| Greenwich Cable Works, Ltd. ... ... | 28 | Skuddes, G. N. ... | 66 |
| Higgins, Mrs., C. H. | 531 | Wenham Lighting Corporation ... ... | 73 |
| Sun Electrical Co., Ltd. ... ... ... | 282 | Wholesale Lamp Co. ... | 84 |

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J. WYNDHAM (trading as Wyndham's Wireless & General Manufacturing Co.), 114, Tottenham Court Road, W., wireless and general manufacturer.—The first meeting of creditors was held last week at the London Bankruptcy Court, when the Official Receiver reported that the debtor had not surrendered to the proceedings, and nothing was known regarding his present whereabouts or the liabilities and assets. A resolution was passed for Mr. Wallace Hepburn, 1 & 2, Bucklersbury, E.C., to act as trustee of the estate.

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E. G. M. PAGE, dealer in wireless sets and accessories, 46 and 67, Bohemia Road, St. Leonards-on-Sea.—Adjudication order annulled and receiving order of September 11th rescinded on December 2nd, a sum of money having been lodged with the Official Receiver sufficient to pay the costs and expenses of the bankruptcy proceedings, and the whole of the creditors in full.

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E. J. G. HURLES, wireless dealer, 119, Cambridge Road, Teddington, and 8, Blackfriars Road, S.E.—Bankrupt's discharge suspended until November 29th, 1931.

J. H. B. TATTERSALL, plumber and electrician, 456, Burnley Road, Scout Bottom, Waterfoot, Lancs.—Last day for proofs for dividend, January 8th. Trustee, Mr. J. W. Turner, Official Receiver, Byrom Street, Manchester.

E. H. NEWMAN & M. BAYNES (Langham Radio), wireless manufacturers, 96, Regent Street, W.—Trustee, Mr. F. G. Priestley, 6, Guilhall Chambers, E.C.2, appointed December 18th, 1929.

A. E. RANDLE, telephone engineer, 177, Edward Street, Nuneaton.—Trustee, Mr. C. J. Band, Official Receiver, 9-11, High Street, Coventry, released December 5th, 1929.

H. B. POWELL, wireless dealer, 10, Union Street, Hereford.—Trustee, Mr. O. B. Wallis, Official Receiver, 133, St. Owen Street, Hereford, released December 11th, 1929.

E. D. JONES, electrical engineer, Royal Sportsman Hotel, Portmadoc.—Trustee, Mr. I. D. Hooson, Official Receiver, St. Peter's Churchyard, The Cross, Chester, released December 5th, 1929.

M. WOOLLRIDGE (Woollridge Radio Co.), 26 and 39, Lisle Street, W.C.—Bankrupt's discharge suspended until February 19th, 1930.

H. R. D. RADCLIFFE and F. HADDLETON (City Electric Services), electrical engineers, 51, Islington Row, Birmingham.—First and final dividend of 2 7/16d. in the £, payable at the Official Receiver's office, 191, Corporation Street, Birmingham.

## Private Arrangements.

B. SMITH and B. I. EVANS, trading as "Radidys," wireless retailers, 841, Fulham Road, S.W.6.—A meeting of creditors was held on December 23rd at the offices of Messrs. Percy Phillips & Co., 132, Great Portland Street, W.1, when a statement of affairs was presented which showed liabilities of £427 and net assets of £117, leaving a deficiency of £310. The debtors commenced business in July last, the debtor Evans putting in £350 cash and £50 worth of goods. The debtor Smith brought a motor car into the business, on which he had paid £100 under a hire-purchase agreement, and stock amounting to £216. Against that he had trade creditors and a bank overdraft amounting to £266, which the partnership concern took over. His net capital was therefore £50, and the total partnership capital was £450. The deficiency was accounted for by the depreciation of stock, fixtures and fittings, and motor car, £152, a loss on trading, and the salaries of the debtors. One of the debtors said that they had tried to keep up the prices of their stock, but they were handicapped owing to the fact that there were several wireless shops in the vicinity where the prices were cut, and in some cases goods were sold by the competing firms at prices less than those at which the debtors could purchase them. An offer was made of 4s. in the £, in cash, but the creditors considered that the offer should be increased to one of 5s. in the £, in cash, payable within seven days.

Mr. Durs, representing Messrs. Brahams, Ltd., who were creditors for over £200, said that he had no instructions to bind his clients in any composition arrangement, but he would report the result of the meeting to them, and let the accountant know the course that they wished to take in the matter. The following are creditors :—

| | £ | | £ |
|---|---|---|---|
| Brahams, Ltd. ... | 205 | Callender's Cable & Construction Co., Ltd. ... | 28 |
| Sacks, Alfred ... | 103 | | |
| Oldhams, Ltd. ... | 36 | | |

## Company Liquidations.

BRITISH HELE-SHAW PATENT CLUTCH CO., LTD.—Winding up voluntarily. Liquidator, Mr. W. H. Kelsall, Hartford New Works, Oldham.

CHIRK ELECTRICITY SUPPLY CO., LTD.—A meeting of members is called for January 27th at the Parish Hall, Chirk, to hear an account of the winding up from the liquidator, Mr. W. G. Lloyd.

ELECTRICITY (HULL), LTD.—Winding up voluntarily. Liquidator, Mr. R. Verity, 135, High Street, Hull.

## Dissolution of Partnership.

STUBBINGS & ROE, motor, electrical, and general engineers, 160, London Road, Nottingham.—Mr. J. W. Stubbings and Mr. A. E. Roe have dissolved partnership. Mr. Roe will attend to debts and continue the business under the style of "The London Road Garage."

## Deeds of Assignment.

J. H. MCNAIR RICHMOND, electrical engineer, 6a, High Street, Godalming.—Particulars of claims by January 3rd to the trustee, Mr. W. A. J. Osborne, 119, Finsbury Pavement, E.C.

C. FRANCE (Radio Equipment), wireless engineer, 180, King's Cross Road, Halifax.—Particulars of claims and assent to the deed by February 24th. Trustee, Mr. A. N. Buckley, 45 and 47, Commercial Street, Halifax.

## Trade Announcements.

Messrs. R. PEACOCK & Co., electrical contractors, 1156, Cathcart Road, Glasgow, have opened a workshop at 182, Trongate.

Messrs. W. E. BEARDSALL & Co., LTD., have been appointed sole selling agents for the "Xtra-Point" lampholder and plug.

Mr. G. D. WHITHAM, electrical engineer and contractor, has opened temporary business premises at 70, Elaine Street, Warrington.

Messrs. HOGAN & WARDROP inform us that their removal from Golden Lane to 25, Old Street, E.C.1 (announced in our last issue) was necessary owing to the building at their former address having been condemned as a dangerous structure.

## French Tube Manufacturers' Appeal.

Nine of the principal concerns in France producing insulated tubing for electrical installations who are members of the French Association pour la Normalisation et la Vulgarisation des Tubes Isolateurs et de leurs Accessoires have issued a notice urging French electrical engineers to use only French-made tubing which is produced in one quality only in accordance with the Association's standards. The object of the appeal is to reduce the growing use of foreign tubing which is stated to be made in three weights and in three qualities none of which is equal to the French product.

## Trade Relations with Russia.

On the resumption of diplomatic relations with the Soviet Union it has been decided to re-establish commercial diplomatic posts which were terminated on the suspension of diplomatic relations in 1927. The Department of Overseas Trade notifies us that a Commercial Secretary, First Grade, with local rank of Commercial Counsellor, and a Commercial Secretary, Third Grade, will be stationed at Moscow. The senior post will be filled by the appointment of Mr. G. P. Paton, C.B.E., British Consul at Tamsui, Formosa, and the junior posts by the appointment of Mr. S. Simmonds, Vice-Consul at Constantza, Rumania. It is anticipated that these officers will take up duty at Moscow during January or early February. Mr. Paton served at various posts in the Japan Consular Service until 1920, when he was placed in charge of the consulate at Vladivostock, and in 1921 was promoted to be Consul. He remained at Vladivostock until the suspension of diplomatic relations in June, 1927.

## American Capital in Brazil.

Dealing with the development of South America, a German newspaper points out that the penetration of American capital in Brazil is being specially displayed in the electrification of the country. To a much larger extent than in Argentina the large American concerns have gained a footing in the electricity works in Brazil outside the towns of Rio and Sao Paulo, and have thereby obtained an almost determining position in the trade in electrical machinery and apparatus, their large capital means giving them an advantage in the holding of stocks and in the conditions of delivery. It is also assumed that the schemes for the extension of the means of communication from the coast to the interior of the country, most of which have had to be postponed this year owing to the financial crisis, will also devolve mainly upon American firms.

### Recent Contract.

Messrs. W. H. ALLEN, SONS & CO., LTD., Bedford, have secured an important contract for ten steam turbines and condensing plants for driving hot oil centrifugal pumps for the new oil-cracking plant of the Anglo Persian Oil Co., Ltd., at Abadan. The contract was secured through Messrs. Perrins, Ltd., the British representatives of the Kellogg Co., the makers of the hot oil pumps and the main contractors for the cracking plant. We are informed that efficiency and quick delivery were two of the main points in the settlement of this contract.

### The Irish Free State Electrical Market.

A contributor to the *Irish Electrician* analyses the Free State's electrical imports over a period of four and a half years, ended with June last. He shows that during this period the total value of imports has been £2,489,445, of which £464,547 is credited to the first half of 1929. The principal single item in the list is insulated wires and cables, which account for 27.2 per cent. of the total. The following classes are next in order:—Miscellaneous electrical goods and apparatus, 19.6 per cent.; electrical machinery (except generators and motors), 19.4 per cent.; electric lamps and parts, 11.3 per cent.; batteries, accumulators and parts, 6.2 per cent.; generators, 5.9 per cent.; telegraph and telephone instruments and apparatus, 5.2 per cent.; and motors, 5.2 per cent. The writer says that it is not possible to take the total figures as an indication that the market is expanding, owing to the fact that there have been unusual imports during the period. He thinks it justifiable, however, to take the figures relating to electric lamps as an index of the entire electrical market, and on this basis he considers that the market is developing at an extraordinary rate.

In an editorial note commenting on the article, our contemporary considers that electrical imports should reach the two-million-pound mark in 1930. The note concludes: "Salesmanship, and all that word connotes, is just as important in Ireland as elsewhere, and the market is open to the world without favour."

### A British Success in Argentina.

The December *Monthly Review* of the Bank of London and South America, makes reference to the important order recently given by the contractors for the new Lacroze subway, Buenos Aires, to three British companies. Fifty-six all-steel cars, their necessary electrical equipment, and electro-pneumatic signalling for the line, to a total value of some £600,000, have been ordered from the Metropolitan-Cammell Carriage, Wagon, and Finance Co., Ltd., the General Electric Co., Ltd., and the Westinghouse Brake and Saxby Signal Co., Ltd. It is said that these orders were obtained in keen competition with Continental and American manufacturers, price and quality alike favouring the final decision to take British goods. For machinery in general the prospect for British makers is said to be better all round. Nevertheless, in a recent call for tenders by the State Railways for locomotives, English prices were decidedly above those quoted by German, Swedish, and United States makers, though without full knowledge of the specifications and terms involved mere price comparison is not altogether dependable as a basis for conclusions.

### For Sale.

Salford Corporation invites offers by January 4th for the purchase of two Weir centrifugal feed pumps and motor-driven reciprocating feed pumps and a number of a.c. motors, starters, &c. Messrs. Henry Butcher & Co., 63 & 64, Chancery Lane, W.C.2, invite tenders for the purchase of electrical and pumping plant and machinery. Mr. E. Fryett will sell by auction at the London Trade Sale Rooms, Ltd., 78-81, Fetter Lane, E.C., on January 8th, the stock-in-trade of electrical engineers. (See our advertisement pages to-day.)

### Book Notices.

"Elektrobetrieb im der Textilindustrie," by Dr. Ing Wilhelm Stiel. Pp. xiv+652. Leipzig: S. Hirzel. Price Rm. 33.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLVIII. December, 1929. No. 12. New York: The Institute. Price $1.

### The British Exhibition in Buenos Aires.

The December *Monthly Review* of the Bank of London and South America says that the response of British industry to the invitation to participate in the British Empire Trade Exhibition in Buenos Aires has been remarkable. In spite of the length of time before the exhibition opens—it will last from February 18th to April 2nd, 1931—two-thirds of the available space was booked up within six weeks from the day when it was first offered. In addition to this, over 800 firms have approached the management with inquiries, and still have the matter under consideration. The buildings and grounds occupy some 25 acres, but they will almost certainly prove insufficient and will have to be added to. Even so, it is extremely probable that the demand for space will ultimately exceed the supply. Applications are fairly evenly divided between firms who are already established in Argentina and firms who have hitherto done little or no business in that country. They come from all classes of manufacturer. Some sections, such as engineering, are better represented at present than others, but there is every reason for hoping that eventually the Exhibition will prove to be a well balanced and comprehensive showing of the industries of the British Empire. The London office of the Exhibition is at 5, Parliament Mansions, Orchard Street, S.W.1.

### Calendars and Diaries.

A refill for their desk calendar has been sent by Messrs. F. PARKS, LTD., 59, Newman Street, W.1. Each daily slip bears a moral epigram.

The 1930 diary of the CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, near Manchester, is of a convenient size for the pocket and contains a good deal of useful information.

A diary with a distinctive red morocco binding has been received from Messrs. WHIPP & BOURNE, LTD., Castleton, Manchester. It has ample diary space and about 140 pages of technical data, mainly in connection with radio work.

The COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD., has once again sent us a telephone number card for the New Year.

Examples of the company's oil engines are illustrated on the monthly sheets forming the 1930 calendar of Messrs. CROSSLEY BROS., LTD., Openshaw, Manchester.

A pad of daily slips below an illustration of one of the firm's porcelain-handled fuses forms the calendar received from Messrs. H. J. FULLER & SONS, Meadow Lane, Leeds.

We have again received a serviceable "At-a-glance" calendar from Messrs. FRANCIS POLDEN & CO., LTD., 56, Cannon Street, E.C.4.

A lady reminiscent of Watteau (or perhaps Fragonard) appears on the 1930 calendar of the CARRIER-ROSS ENGINEERING CO., LTD., Victory House, Regent Street, W.

An excellent aerial view of Liverpool from above the Mersey is the subject of this year's calendar of the LIVERPOOL ELECTRIC CABLE CO., LTD., Linacre Lane, Bootle.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs., has sent us a very neat petrol lighter for the desk. It is attractively finished in oxidised silver and houses a section of three-core cable.

BRITTAIN'S ELECTRIC MOTOR CO., Dermody Road, Lewisham, S.E.13, sends us a businesslike wall calendar with bold-figured monthly sheets and illustrations of the firm's motors.

A pad of large daily slips below a view of the company's works form the 1930 calendar of the REVO ELECTRIC CO., LTD., Tividale, Tipton, Staffs.

"My Best Friend," the subject of a calendar sent us by Messrs. CHRISTY BROS. & CO., LTD., Chelmsford, depicts a fair lady with an Alsatian wolfhound. The picture is beautifully printed on silk.

"Moya," the subject of the handsome 1930 calendar of Messrs. DOWNES & DAVIES, Stanley Street, Liverpool, is a proud blue-eyed brunette.

The WESTINGHOUSE ELECTRIC INTERNATIONAL CO., 2, Norfolk Street, W.C.2, has again sent us one of its neat little diaries. It contains a great amount of useful technical information, and notes on the Westinghouse organisation.

Messrs. J. F. MELLING, LTD. (agents for Fried. Krupp A.G.), 11, Victoria Street, S.W.1, has sent us a 1930 diary containing, in addition to memoranda space, over 160 pages of technical data of all kinds. It forms a most useful pocket reference book.

A calendar depicting a man-of-war under way, presumably guided by one of the company's gyro compasses, has been received from Messrs. S. G. BROWN, LTD., Western Avenue, North Acton, W.3.

Messrs. FRANCIS POLDEN & CO., LTD., 56, Cannon Street, E.C.4, have retained for 1930 the neat form which has characterised their diaries for several years past. It is bound in maroon leatherette this year.

Two calendars, to suit widely-differing tastes, have been received from the Lytham St. Annes Electricity Department. One bears a reproduction of a water-colour sketch—"Off Algiers"; while the other depicts a very rakish golfing juvenile—"Hector." The latter has a matchbox-holding device, and both have neat monthly slips.

A useful desk diary has come from the LEA RECORDER CO., LTD., 28, Deansgate, Manchester. Interleaved with the weekly sheets are illustrations of the company's products.

An ash-tray received from INSULATORS, LTD., Derby Road Works, Montague Road, Edmonton, N.18, is an excellent example of moulded "Bakelite."

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We desire to thank the many friends who have sent us the season's greetings and to assure them that their good wishes are heartily reciprocated.

### A Russian Trade Scheme.

In the December issue of the *British-Russian Gazette*, Lieut.-Commander J. P. Mandeville, A.M.I.Mech.E., contributes some impressions of his visit to Russia with the British Trade Delegation. He shows that trade with Russia is contingent upon the granting of credit, but acknowledges that the risk must be minimised. He has accordingly evolved a scheme for the sale of machinery to Russia, which, he claims, would satisfy the conditions. It is based on the fact that many manufacturers could increase their production by 10 per cent. without appreciably adding to their overhead charges. Commander Mandeville suggests that the cost of wages and materials would in many cases be less than 50 per cent. of the selling price of the machine, and that if this 50 per cent. could be obtained on delivery, the manufacturer would not

be at an actual loss if the remainder were never paid. He suggests that the balance could remain at interest, the payment to be a matter of arrangement. One stipulation made is that the manufacturer should be allowed to deliver the machinery at his own convenience.

### New Catalogues and Lists.

Messrs. H. J. FULLER & SONS, Fisher's Yard, Meadow Lane, Leeds.—Two illustrated and priced leaflets drawing attention to "Fuller" switch-fuses.

ELECTRIC RESISTANCE FURNACE CO., LTD., 17, Victoria Street, S.W.1.—The first number of "The Resistance Furnace" contains a review of heat as an industrial medium.

CROMPTON PARKINSON, LTD., Bush House, Aldwych, W.C.2.—Two booklets containing useful notes on the installation and maintenance of Crompton d.c. and Parkinson a.c. machines.

M.S.L., LTD., 67, Hammersmith Road, Kensington, W.14.—An illustrated price list of "Splendour" lamps.

FRY'S (LONDON), LTD., 24-26, Water Lane, E.C.4.—A comprehensive catalogue (pp.102) of small tools for engineers and carpenters, giving brief particulars, dimensions, and prices. Fully illustrated.

Messrs. FRANCIS POLDEN & CO., LTD., 56, Cannon Street, E.C.4.—A folder illustrating some of the large buildings in which the company has installed complete electrical installations.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Publication No. P.F. 66, drawing attention to "Copperweld" earthing rods.

Messrs. W. E. BEARDSALL & CO., LTD., 5, Victoria Bridge, Manchester.—Two illustrated leaflets, giving dimensions and prices of the company's enclosed lighting units, bowl fittings, shades, &c.

SUN ELECTRICAL CO., LTD., 118 & 120, Charing Cross Road, W.C.2.—An abridged edition of the company's electric light fittings catalogue (pp. 128). Fully illustrated and priced.

B.E.N. PATENTS, LTD., 92, Tottenham Court Road, W.1.—A leaflet prepared by Tecalemit, Ltd., showing their air line "Lubrigun" mounted on a B.E.N. dual air unit.

### An East African Electrical Scheme.

Major C. L. Walsh, managing director of the East African Investment Company, was informed on December 23rd by the Colonial Office that the Government of Tanganyika Territory had accepted the tender of the Power Securities Corporation for the utilisation of the Pangani River Falls for the production of electric power. It is understood that although the successful tender restricted the provision of power to within a radius of 60 miles of the falls, inclusive of the port and township of Tanga, the terms of the concession are considered to represent only a nucleus of a system of general expansion, and that electricity could suitably and economically be supplied to Dar-es-Salaam through the same scheme at a later date. The necessary work, to be put in hand at once, is expected to occupy between two and two-and-a-half years, and will involve the construction of dams, weirs, watercourses, pipelines, and buildings, and will mean a considerable amount of work for the electrical and associated industries in this country. The scheme provides for the production of 5,000 kW, with 2,500 kW in reserve. It is believed that the carrying out of the scheme, which will be one of the most important plans of development to have been undertaken in East Africa, will be of much assistance to the sisal-growing industry in Tanganyika, which is now making steady progress.—*The Times.*

### Prices of Materials.

Messrs. F. Smith & Co. report, December 31st: Copper (electrolytic) bars, £83 10s., 10s. dec.; ditto ditto sheets, no change; ditto ditto wire rods, £89 10s., 10s. dec.; ditto ditto h.c. wire, no change.

Messrs. James & Shakespeare report, December 31st: No change in copper and lead prices.

Messrs. Edward Till & Co. report, December 31st: India-rubber, Para fine, 8¼d., ¼d. inc.

## Lighting and Power Notes.

**Bangor.**—FLOODS.—During a thunderstorm on Monday last over 2 in. of rain fell in less than two hours. Flooding occurred, the water invading the electricity generating station.

**Barking.**—SUPPLY TO HOUSING ESTATE.—The Urban District Council Electricity Committee has acceded to the request of the London County Council to give a supply of electricity to the 1,414 houses proposed to be erected on the Barking section of the Becontree estate.

**Bexhill-on-Sea.**—MAINS EXTENSIONS.—The Town Council has decided to provide a sub-station at Mount Idol Farm at an estimated cost of £2,757, to extend the h.p. cable at a cost of £1,635, to provide a l.p. feeder at a cost of £1,472, and to lay a distributor cable through Mayo Lane to Watermill Lane at a cost of £353. The electrical engineer submitted a scheme for extensions in the north part of the town, including Sidley, at a cost of about £11,500. The Electricity Committee approved the proposal generally, but for the present has recommended approval of one part of the scheme only.

**Birmingham.**—SERVICE DEPOTS.—The Corporation Electric Supply Committee has decided to open small branch service depôts or showrooms in various suburban areas for the convenience of consumers and prospective consumers. Birmingham ratepayers are to be allowed to inspect the Hams Hall power station on days to be fixed in the spring and autumn this year.

ELECTRICITY SUPPLY PROGRESS.—The total capacity of the motors installed on consumers' premises now being supplied exceeds 330,000 h.p. During November an additional 1,200 premises were connected representing an extra 12,000 lamps in the lighting section and 1,500 h.p. in the power section.

**Brazil.**—SAO PAULO.—Following an agreement between the Sao Paulo Tramway, Light & Power Co., and the Sao Paulo Gas Co., Ltd., the contract of the latter for the lighting of the city has been transferred to the former company. The date of termination of the contract has been extended from 1950 to 1960.

**Colne.**—UNEMPLOYMENT SCHEME.—The Town Council has passed a scheme to provide work for the unemployed, involving an expenditure of £11,317, for the provision of mains in undeveloped areas, the laying of ducts, the provision of cables and apparatus for the change-over to a.c., and the extension of the Water Street sub-station building.

**Continental.**—RUMANIA.—Negotiations are reported to be in progress in Bucharest with regard to the formation of a new company, under the auspices of the A.E.G. Co. and the Rumanian Banat Mining Co., to establish a new central power station of 20,000-kW capacity either in the vicinity of the Banat Co.'s collieries or near the town of Temesvar.

AUSTRIA.—An amalgamation has recently been effected of the various electricity undertakings of the Upper Austrian Water Power & Electricity Co. and the Stern & Hafferl Co. The new concern, which is known as the Upper Austrian Power Co. (Oeka), will control practically the whole of the electricity supply in Upper Austria and in the greater part of the Salzburg area.

NORWAY.—The new Karseforsen hydro-electric power station on the Lagan river, erected by Sydsvenska Kraftaktiebolaget, has already started one of its sets producing 22,000 h.p., and the other set, of the same capacity, will soon be completed. The construction of the power station was commenced in July, 1928.—*Reuter's Trade Service* (Stockholm).

**Douglas (Isle of Man).**—NEW POWER STATION INAUGURATED.—The Corporation's new power station, which has been erected at Pulrose at a cost of about £60,000, was inaugurated on December 20th.

**Fleetwood.**—ELECTRICITY SUPPLY EXTENSIONS.—The Town Council intends to extend mains and erect sub-stations in the south-western part of the town at an estimated expenditure of £15,000. Progress with the scheme is dependent on the approval of the Unemployment Grants Committee.

**Hebden Bridge.**—LOAN.—The Urban District Council has applied for sanction to a loan of £3,000 for mains, services, and meters for a period of three years.

**Ilford.**—LOANS.—The Corporation Electricity Committee is making application for sanction to a loan of £9,700 for sub-station plant. Sanction has also been received to a loan of £50,000 for mains and services.

**Hull.**—CHANGE-OVER.—At a meeting of the Corporation Electricity Committee, held recently, the engineer reported that in order to standardise and reduce the cost of distribution, it was desirable to proceed with the changing over of certain portions of the distributing network from d.c. to a.c. and recommended that application be made to the Electricity Commissioners for consent to the change-over of the system as and when the Corporation required. The recommendation of the engineer was adopted.

MOTIVE POWER CHARGE REDUCTION.—At a meeting of the Corporation Electricity Committee, held recently, the engineer reported that he had preliminarily reviewed the financial position of the undertaking and would submit a full report and recommendations in connection with the tariffs at the next meeting, together with the financial estimates. In the meantime, however, he recommended that the existing motive power scale should be subject to a reduction of 10 per cent. as and from the December readings of the meters. The recommendation was adopted.

**Irish Free State.**—DUBLIN.—The Electricity Supply Board announces the following revised rates of charge for industrial power to take effect from January 1st:—(*a*) For city of Dublin and the urban districts of Pembroke, Rathmines and Rathgar: First 3,000 kWh per quarter, 2d. per kWh; next 2,000 kWh, 1½d.; any further quantity above 5,000 kWh, 1d. per kWh. (*b*) For other parts of Greater Dublin and the city of Limerick and district: First 3,000 kWh per quarter, 2½d. per kWh; next 1,000 kWh, 1½d., any further quantity above 4,000 kWh, 1d. per kWh. (*c*) Other towns and villages in which networks have been constructed by the Board: First 2,500 kWh per quarter, 2½d. per kWh; next 1,000 kWh, 1½d.; any further quantity above 3,500 kWh, 1d. per kWh. Water heating: ½d. per kWh.

**Isle of Thanet.**—NEW POWER TARIFF.—The Isle of Thanet Electric Supply Co., Ltd., announces the following new tariff for power as from January 1st next:—First 5,000 kWh per annum, 3.75d. per kWh; next 5,000, 3.5d.; next 5,000, 3.25d.; next 10,000, 3d.; next 25,000, 2.5d.; next 25,000, 2d.; next 25,000, 1.5d.; beyond 100,000, 1.25d. per kWh.

**Leatherhead.**—STREET LIGHTING.—The Urban District Council has accepted the tender of the Leatherhead & District Electricity Co. for public lighting for a period of 5½ years, with 205 lamps at £975 per annum.

**London.**—HORNSEY.—The Corporation has received sanction to the borrowing of £30,000 for mains and services.

The Corporation Electricity Committee is to extend mains at an estimated cost of £722.

POPLAR.—The Borough Council Electricity Committee is applying for sanction to loans of £21,466 for services, £6,654 for meters and £6,680 for wiring installations.

**Long Eaton.**—YEAR'S WORKING.—The accounts of the Urban District Council's electricity undertaking (engineer, Mr. F. Newey) for the twelve months ended March 31st last record a total revenue of £28,816, as compared with £25,054 in the preceding year. The working expenditure totalled £18,756, as against £16,927, leaving a gross profit of £10,060 (£8,127). Interest and loan repayments absorbed £5,328, and there was a net surplus of £4,732. The capital expenditure during the year amounted to £10,428, the principal items being £6,861 for mains and services and £2,403 for meters. The total now expended on the undertaking stands at £117,416. The sales of electricity increased from 2,669,307 to 3,029,005 kWh, and the maximum supply demanded from 1,246 to 1,449 kW. The average price obtained per kWh rose from 2.044d. to 2.088d.

**Morecambe.**—EXTENSION OF SUPPLY AREA.—At a recent meeting of the Corporation Electricity Committee, consideration was given to the advisability of extending the supply to an area off Lancaster Road embracing Croft Street, Dudley Street, Buxton Street, Maylands Square, and Hope Street, and the engineer was instructed to prepare a complete scheme for submission to the Unemployment Grants Committee with a view to a grant.

**Paisley.**—YEAR'S WORKING.—We have received from Mr. W. Blair Smith, engineer and manager of the Corporation Electricity Department, a copy of the abstract of accounts of the undertaking for the year ended May 15th last. The total revenue amounted to £101,133, while the working expenditure was £55,094, leaving a gross profit of £46,038. To this was added the balance in hand at the beginning of the year, making a total of £48,978 available, and after providing for capital and other charges there was a net balance in hand of £4,806. The capital expended during the year amounted to £32,587, of which the principal items were £8,631 for mains and £13,947 for services. The total now spent on the undertaking stands at £654,436. The electrical energy sold increased from 11,711,711 to 12,744,207 kWh, and the maximum supply demanded, from 5,400 to 5,800 kW.

LOAN SANCTIONED.—The Corporation Electricity Department has received sanction to the borrowing of £20,000 for electricity purposes.

**Philippine Islands.**—HYDRO-ELECTRIC SCHEME.—Construction work will begin shortly on a new hydro-electric development, says *Eastern Engineering*. This will have a head of 635 ft., and will be situated on the Bogotan River about 50 miles from Manila. The electrical energy will be transmitted over a steel tower transmission line at a pressure of 110,000 volts. The initial capacity will be 25,000 h.p., and the equipment will be of the latest design, the water-wheel generators being rated at 720 r.p.m. The power to be generated will supply the major portion of the electrical requirements of Manila and the adjacent and intervening territory, and will be augmented by steam generated power at peak loads.

**Porthcawl.**—SPECIAL ORDER TRANSFERRED.—The Urban District Council has ratified its agreement with the General Electric Co., Ltd., for the lighting of the town, and the Council's Special Order has been transferred to the company.

**Preston.**—HIRE-PURCHASE SCHEME.—The Corporation Electricity Committee is to apply for sanction to a loan of £10,000 for wiring consumers' premises on the hire-purchase system.

**St. Helens.**—WORKS' SUPPLIES.—The Town Council has received sanction to a loan of £1,100 for overhead mains and sub-station equipment in connection with a supply of energy to the works of the United Glass Bottle Manufacturers, Ltd., at Ravenhead. The Council has also entered into an agreement for a supply of electricity to the Triplex Glassworks at Eccleston.

**South Africa.**—CAPE PROVINCE.—Sanction has been received by the Cradock Town Council to a loan of £15,500 for plant extensions, and also by the Ladysmith Town Council to a loan of £150,000, to include £5,000 for electric lighting extensions.

**Southend-on-Sea.**—LOANS.—The Town Council has applied for sanction to loans of £12,000 for services, £4,300 for the reconstruction of the d.c. switchboard at the main generating station; and £100,000 in connection with the changing-over of the system.

**Special Orders.**—Application has been made to the Electricity Commissioners by the West Hampshire Electricity Co., Ltd., to amend the West Hants Electricity (Extension) Special Order so as to include certain parts of the rural district of Winchester.

The Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the West Lancashire Rural District Council to supply electricity to certain parishes in its area.

**Stoke-on-Trent.**—BULK SUPPLY.—At a recent meeting of the Corporation Electricity Committee a letter was received from the electrical engineer of Leek, making application for a bulk supply at Longsdon, and for the connection to the e.h.p. near to Wall Grange railway station. The Committee authorised the engineer to make the necessary arrangements for this supply to be given, and has obtained sanction to borrow £2,442 for the purpose.

**Tynemouth.**—YEAR'S WORKING.—The report of the borough electrical engineer, Mr. C. Turnbull, on the working of the Corporation electricity undertaking for the year ended March 31st last shows a total revenue of £64,304, a working expenditure of £39,323 and a gross profit of £24,981. The figures for the preceding year were: Income, £62,938; working expenses, £42,447; gross profit, £20,491. Interest on loans absorbed £6,763 and contribution of sinking fund and loan instalment a further £5,262, while £100 was transferred to the insurance reserve account. There remained a net surplus of £12,856, as compared with £10,345 in the preceding year. Apart from the assisted wiring scheme the capital expenditure during the year amounted to £12,939 bringing the total spent on the undertaking to £246,335. The electrical energy sold increased from 7,676,098 to 8,212,704 kWh. The assisted wiring scheme showed a considerable increase in popularity, 710 new consumers being connected during the year.

**Uckfield.**—ELECTRICITY SUPPLY.—The Rural District Council has decided to ask the Ministry of Transport to rescind the powers of the Uckfield Gas & Electricity Co., with regard to the parishes of Buxted and Hadlow Down, in the event of the company not supplying electricity to the two villages within two months.

**Wrexham.**—MAINS EXTENSIONS.—The Town Council has applied for sanction to a loan of £8,000 for mains and services.

# Tramway and Railway Notes.

**Birmingham.**—TRAMWAY ABANDONMENT.—The Corporation Tramways and Omnibus Committee has decided to discontinue the Bolton Road tramway service from January 31st and to substitute 'buses.

**Brazil.**—RAILWAY ELECTRIFICATION.—The Federal Government has decided to electrify the Curityba-Paranagua branch railway (68 miles) operated by the São Paulo-Rio Grande railway. Tenders will be invited for the work. Preliminary information may be obtained from Sr. Director, Inspectoria Federal dos estradas (Ministeria da Viaçao e Obras Publicas), Rio de Janeiro, or, Sr. Dr. Francisco Guatiez Beltrao, Secretaria da Agricoltura (Viaçao e Obras Publicas), Curityba, Paraná.—*Reuter's Trade Service* (Rio de Janeiro).

**Continental.**—DENMARK.—The engineer of the Copenhagen municipal tramway and motor-'bus undertaking has recently issued his report for 1928-29. It shows that the rolling stock remains unchanged at 411 motor-equipped tramcars and 430 trailers. The tramway system in the Danish capital comprises approximately 53½ miles of double and 20 miles of single track. The total car-mileage during the year amounted to 21,062,500. There was a slight fall in the number of passengers carried by the tramcars, from 149,000,000 to 145,600,000, the receipts from the latter totalling £1,287,125.

**Edinburgh.**—TRAMCAR HEATING.—The Corporation transport manager recommends that a further fifty tramcars be fitted with electric heaters.

**Glasgow.**—THE PINKSTON STATION.—Another effort is being made by the Corporation Electricity Committee to prevent the Transport Department from proceeding with its scheme for the reconditioning of Pinkston power station. The Corporation recently sanctioned a proposal of the Transport Committee to spend over £200,000 on reconditioning the station. A recommendation involving £90,000 of this expenditure for the installation of six boilers is now waiting the approval of the Corporation, and this is regarded as a favourable opportunity for reopening the matter. The Electricity Committee proposes that the Transport Department, instead of generating its own power at Pinkston, should take a supply from the Electricity Department's station at Dalmarnock, at 0.3d. per kWh. It is estimated that the Electricity Department would make a profit of £16,000 per annum. It is contended that the Transport Department will obtain its power at a much lower cost, and that, by taking its supply from the Electricity Department, will assist in bringing about an all-round reduction in the cost of electricity. A similar proposal was rejected by the Corporation by a large majority some time ago.

**London.**—ORIGINAL TUBE TRAINS.—The end of the year saw the end of the original tube trains. The Bakerloo train that left Queen's Park for the Elephant and Castle at 12.15 a.m. on January 1st, 1930, was the last of the iron-gate trains to be run on the tube lines, after having completed over 1,000,000

car-miles. Three years ago the replacement of the whole of the original cars commenced, and December 31st saw the completion of the programme; 191 new trains, composed of 1,219 individual cars, have been put into service at a cost of nearly £5,000,000. Their principal features are wide doors in the middle of the cars, improved lighting, cushioned seats, and more powerful motors.

**New Zealand.**—DUNEDIN.—The accounts of the Corporation Tramway Department (manager, Mr. W. H. Mackenzie) for the year ended March 31st last show a gross revenue of £155,494, as compared with £154,827 in 1927-28, while the working expenses were £106,537, as against £105,866. There remained a gross profit of £48,957 (£48,961), and after making allowance for capital charges, &c., there was a net surplus of £5,833, as compared with £6,917 in the preceding year. The number of passengers carried increased from 20,955,139 to 21,116,401 but the car mileage fell from 1,708,099 to 1,700,578.

**Rowley Regis.**—TRAMWAY ABANDONMENT.—The Urban District Council has come to an arrangement with the Birmingham & Midland Joint Committee of Electricity Tramway and Motor Omnibus Undertakings, for the abandonment of the tramway between Old Hill and Cradley Heath.

**Tramways and Light Railways Association.**—CHANGE OF NAME.—At a recent meeting of the Council it was unanimously decided to recommend to the members of the Association that its name be changed to "The Tramways, Light Railways and Transport Association," in order that the name of the Association should more nearly represent the interests of its members, many of whom are now actively interested in trolley-'buses and motor-omnibuses, in addition to their tramways. An extraordinary general meeting will be called shortly to enable the Council to explain its views to members, and to discuss the proposal with them.

**United States.**—NEW YORK.—A hundred and fifty electric locomotives, estimated to cost $16,000,000, are being ordered by the Pennsylvania Railroad for operation on the route between New York and Washington, *via* Philadelphia. The locomotives will be used in pairs, giving 6,000 h.p., and will attain a maximum speed of at least 90 m.p.h.

# Telegraph and Telephone Notes.

**Australia.**—TELEPHONE TARIFF.—Although every endeavour has been made to operate the telephone service economically, the general trend of rising costs has brought about an annual loss of more than £300,000. In consequence, it has been imperative to adjust the tariff, certain objectionable anomalies have been corrected, and metropolitan areas enlarged from 10 to 15 miles radius. The new rates will operate from December 16th. The main increases are in charges for trunk calls, and in annual rental rates. As the result the telephone branch expects to increase its revenue by approximately £150,000 this financial year.

**Canada.**—CABLE TOLLS.—Mr. Jean Knight, French Minister to Canada, on his return to Ottawa from Paris, stated that an agreement was pending between the French Government and the cable companies for parity of cable tolls from France to the United States and from France to Canada, thus removing the present disparity to Canada's disadvantage.—*Reuter's* (Ottawa.)

**Germany.**—TELEGRAPHY.—The laying of a new submarine telegraph cable between Emden (Germany) and Vigo (on the north-west coast of Spain) has lately been completed by the German-Atlantic Telegraph Co.

**International Telephony.**—CZECHO-SLOVAKIA.—Work is about to be commenced by the Post and Telegraph Authorities on the laying of a telephone cable between Mistek and Mährisch-Ostrau, which will connect the Prague-Polish frontier line with the German telephone system near Hat on the Upper Silesian frontier, by means of a new line between Hat and Cosel, which is being established on the German side.

ITALY.—A new telephone cable has lately been completed between Rome and Florence, a distance of about 180 miles.

SWEDEN—ENGLAND.—The Swedish Telegraph Department is reported to be contemplating the laying of two additional telephone cables to England, one from Stockholm and one from Malmo, to cope with the growing congestion on the existing lines.

**Java.**—RADIO-TELEPHONY.—Java was linked to Germany by radio-telephone for the first time on December 28th, when the Minister of Posts in Berlin spoke to the director of public works at Bandoeng and various other officials.—*Reuter's* (Batavia).

**The Telephone Service.**—PUBLIC ADDRESS.—Major Elliot, M.P. for the Kelvingrove Division of Glasgow, recently addressed his constituents by telephone from a cabinet in the House of Commons. The hall in Glasgow, where a social meeting and dance were being held, was equipped with loud-speakers.

# Radio Notes.

**Austria.**—LICENCE FEES.—In November, 1929, there were 371,011 subscribers, the majority of whom paid a tax of 1s. 2d. each monthly. It is proposed that that figure shall be the universal uniform rate, irrespective of income, but there is a suggestion that it should be reduced to 9d. It is also proposed to allow notice of licence discontinuance to be given in June and December, in place of the 12 months' obligation now in force.

**Germany.**—LICENCES.—It is proposed to reduce the three months' notice of licence discontinuance now required to one month.

RECEIVERS ON APPROVAL.—District post-offices have been authorised to allow sets to be installed on approval. The trader must write to the local postmaster informing him of his intention to instal a receiving set at a certain address. As soon as the set has been installed, the Post Office must be informed, says *World-Radio*, whether the installation is permanent or not. If it is permanent, the Post Office will then forward a licence to the owner. The licence fee is chargeable from the first day of the month in which the completion takes place. No fees are payable for the eight days' approval period.

**Holland.**—NEW COMPANY.—A limited liability company has been registered with the title Nederlandsche-Indische Omroep Maatschappij (Netherlands-Indian Broadcast Company) and offices at Amsterdam. The objects of the company are, says *World-Radio*, the development of the radio-broadcast trade in the Dutch Indies and the transaction of all business which bears relation to that trade, and also active or financial participation in any undertakings which may help forward those objects. The nominal capital is one million guilders (£83,333), divided into 30 preference shares and 970 ordinary shares of 1,000 guilders each, of which the preference shares and 170 of the ordinary shares are already subscribed.

**The B.B.C.**—CHIEF EVENTS IN 1929.—From an engineering point of view, the year 1929 was exceptionally eventful for the British Broadcasting Corporation. The most important event was the completion of the first regional station at Brookman's Park, designed to give London and the Home Counties a dual programme service; it started in October with a single programme distribution, and tests on a two-programme basis were started on December 9th. Constructional work was started in October on a similar station for the northern region; it will serve the industrial districts of Lancashire and Yorkshire with a similar service to that provided for London, except that its range may be rather greater.

The new offices of the northern region were opened at Broadcasting House, Piccadilly, Manchester, in April; they include a studio which is regarded as the best in use at present by the B.B.C., together with the most up-to-date control room equipment in Great Britain. Early in the year work was started on the new B.B.C. headquarters in Portland Place, London, on a site occupying an area of about 20,000 square feet. The building will cost over £400,000 to erect, and provide more than 100,000 square feet of floor space. It will be completed in 1931, and will contain some of the most modern engineering equipment in London.

In September a new and more permanent station was opened at Tatsfield to replace the old temporary listening post at Keston, which had latterly become a frequency-checking laboratory, working in conjunction with that of the Union Internationale de Radiodiffusion at Brussels. The carrying out of accurate calibration work rendered it necessary to find a new site upon which a suitable building could be erected, and Tatsfield was equipped for relaying European stations' programmes if and when a land line is not available, as well as for wave-checking.

Experimental transmissions of television were started in October and are still in progress.

During the second half of the year relays from America exceeded in quality all previous efforts to facilitate satisfactory reception for British listeners, which successes was made possible by prolonged experimental work on reception on ultra-short waves.

The year marked the gradual introduction of Continental broadcast programmes relayed by cable as regular items in the B.B.C. programmes. They carried a practically unqualified guarantee of success owing to the development in Europe of a comprehensive system of telephone cables which comprise circuits specially designed for broadcasting. During the year a number of important "outside" relays involved the use of Post Office telephone lines and cables. In December all the cables connecting the Savoy Hill studios with the Brookman's Park transmitter failed, which necessitated the programme being picked up by wireless from Daventry (5 XX) and retransmitted from Brookman's Park. Stations failures were of short duration.

**U.S.A.**—RADIO CENSUS.—Whether he or she possesses a wireless set will be one of five new questions, never before asked in a United States census, which will be put to householders when the next census is taken this year.—*Reuter.*

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.**

## Contracts Open.

**Australia.**—MELBOURNE.—Posts and Telegraph Department. February 18th. Jacks and number plates. (B.X. 5940.)*
February 25th. Jumper rings and terminal strips . (B.X. 5941.)*
February 26th. Victorian Railways. Deaerators and accessories. (A.X. 8935.)*

**Ayr.**—January 8th. County Council. Electrical and heating work in connection with new County Council buildings. Schedules (deposit two guineas) from Alex. Mair, architect, 20, Wellington Square, Ayr.

**Bath.**—January 22nd. Electricity Department. Supply of one 60,000-lb. boiler, one 7,000-kW turbo-alternator, and e.h.p., h.p. and l.p. cables required over a period of 12 months. (See this issue.)

**Belgium.**—January 15th. Belgian Post and Telegraph Authorities, La Salle Madeleine, Brussels. 105 kilometres of cotton covered wire, 200 kilometres of light brown corded two-conductor wires, 1,200 kilometres of enamelled two- and three-conductor wire, two kilometres of 63-conductor telephone cable, 50 kilometres of silk and cotton covered enamelled wire. Particulars (Cahier des Charges Special No. 3456) for 6¼ fr.

**Dundee.**—January 15th. Electricity Department. Supply of two 300-kVA outdoor-type transformers and one 200-kVA outdoor-type transformer. (December 20th.)

**Grimsby.**—January 23rd. Electricity Department. One 10,000-kW, 3-phase turbo-alternator with condensing plant. (December 27th.)

**India.**—South Indian Railway Co., Ltd. January 24th. Madras improvements (electrification) cables and accessories. (December 27th.)

**Liverpool.**—January 23rd. Corporation. Supply and delivery for twelve months ending March 31st, 1931, of cables, meters, lamps, lubricating oils, and other materials. (See this issue.)

**London.**—CENTRAL ELECTRICITY BOARD.—January 6th. Supply, delivery, and erection of 132-kV overhead transmission lines (special crossings and high spans), for the North-West England and North Wales Electricity Scheme, 1928. (November 29th.)
January 20th. Supply, delivery, and erection of 3,300-V, 6,600-V, and 11,000-V switchgear for connecting the Board's supply to undertakers' busbars, North-West England and North Wales Scheme. (December 13th.)
February 1st. Supply, delivery, and erection of 33,000-V overhead transmission lines for the South-East England Electricity Scheme, 1927. (See this issue.)
ISLINGTON.—Borough Council. January 17th. Electrical and engineers' stores for one year commencing April 1st next. (December 13th.)

**Maidstone.**—January 16th. Committee of Visitors. Electrical installation for lighting, heating, &c., at the Mental Hospital, Barming Heath. (December 20th.)

**Manchester.**—January 18th. Waterworks Committee. Supply, delivery, and erection at Haweswater, Westmorland, of three 275-b.h.p. heavy-fuel oil engines. (See this issue.)

**New Zealand.**—WELLINGTON.—Post and Telegraph Department. February 3rd. Protector blocks made of carbon and porcelain. (B.X. 5948.)*
February 13th. Opal lamp caps. (B.X. 5955.)*

**Stalybridge.**—January 15th. Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board. Structural steel framework in extension of Hartshead power station. Specifications (deposit £2 2s.) from W. H. George & Son, architects, 7, Warrington Street, Ashton-under-Lyne.

**Stoke-on-Trent.**—January 13th. Stoke & Wolstanton Board of Guardians. Electric light and power wiring and fittings for new nurses' home, London Road Institution. Specifications from T. Wood, clerk to the Guardians, Main Offices. Deposit £3.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed.

**Australia.**—SYDNEY.—N.S.W. Government Railways.
Ironclad switchgear for Town Hall station (£484).—Siemens (Aust.) Pty., Ltd.
Municipal Council.
Underground cables (£27,609).—Enfield Cable Works (Australia), Ltd.
MELBOURNE.—State Electricity Commission of Victoria.
Single-phase a.c. watt-hour meter (£4,568).—Wm. Begg and Sons.
V.i.r. control cables (£3,798); 6,600-V, 3-core cable (£192).—British Insulated Cables, Ltd. —*Tenders.*

**Ayr.**—Ayrshire Education Committee. Accepted:—
Electrical work in connection with the erection of a primary school.—M. & R. Young.

**Barking.**—Electricity Committee. Recommended:—
8,344 yd. cable (£1,889).—Ateliers de Constructions Electriques de Charleroi.

**Bathgate.**—Accepted:—
Electric lighting installation for the Bathgate Academy and Rectory (£416).—G. Birrell.

**Dublin.**—Department of Posts and Telegraphs.—The following contracts were placed during the month of November, 1929:—
Dry cells. —Siemens-Schuckert (Ireland), Ltd.
Fuses.—Phœnix Telephone and Electric Works, Ltd.
Copper wire.—Thomas Bolton & Sons, Ltd.
Great Northern Railway Co. (Ireland). Accepted:—
Twelve months' supply of Mazda gasfilled electric lamps.—British Thomson-Houston Co., Ltd.

**Egypt.**—The contract for the extension work at the Gabbary power house has been awarded to the Metropolitan-Vickers Electrical Co., Ltd., at £69,802.—*Reuter's Trade Service* (Cairo).

**Evesham.**—Rural District Council. Accepted:—
Wiring Council houses for electric light: 47 houses, Broadway, £174; 36 houses, Norton, £189; 12 houses, Harvington, £64; 16 houses, Hampton, £86.—T. Vale and Sons.

**Guildford.**—Board of Guardians. Accepted:—
X-ray plant (£336), accessories (£33).—A. E. Dean & Co.

**Hull.**—Telephones Committee. Recommended:—
Cable (£494).—Ateliers de Constructions Electriques de Charleroi.

**Leeds.**—Electricity Committee. Accepted:—
Cables (£11,130), Enfield Cable Works, Ltd.; (£12,600), Macintosh Cable Co., Ltd.; (£3,021), W. T. Henley's Telegraph Works Co., Ltd.; (£3,320), Hackbridge Cable Co., Ltd.; (£4,132), Croydon Cable Works, Ltd.; (£1,417), Derby Cables, Ltd.; (£2,227), Edison Swan Cables, Ltd.
Sub-station switchgear (£6,338).—English Electric Co., Ltd.
Health Committee. Accepted:—
Internal telephone system at health department (£358).—Relay Automatic Telephone Co., Ltd.

**Linlithgow.**—Accepted:—
Electric lighting contract in connection with Linlithgow Academy extension scheme.—F. C. Borthwick, Ltd.

**London.**—STEPNEY.—Electricity Supply Committee. Accepted:—
50 tons pitch (£139).—Crow, Catchpole & Co., Ltd.
50 cast-iron boxes, frames and covers (£80).—J. Warner, Ltd.
Steelwork to support a new turbo-generator set (£1,135).—E. Wood & Co., Ltd.

**Perth.**—Transport Committee. Recommended:—
Electrical wiring at new motor 'bus garage.—McCowan and Guild.

**Southend-on-Sea.**—Town Council. Accepted:—
Two 59-seater low-loading trackless trolley vehicles (£4,760).—English Electric Co., Ltd.
Two cylinder heads for 750-kW Diesel engines (£193).—Le Boutellier & Co.

Plates for renewal of 60 cells, Chalkwell battery (£2,661).—Chloride Electrical Storage Co., Ltd.
Four sets transverse seats for tramcars (£669).—G. D. Peters & Co., Ltd.
Tower wagon (£440).—Tilling-Stevens & Co., Ltd.

**Tamworth.**—Town Council. Accepted:—
Installing electric light at houses, £5 per house.—G. R. Coles.

**Wrexham.**—Town Council. Accepted:—
Wiring 160 houses for electric light (£1,100).—Messrs. Thornton.

# Forthcoming Events.

**Schoolboys' Exhibition.**—December 31st—January 8th. Horticultural Hall, S.W.

**Institution of Mechanical Engineers.**—Friday, January 3rd. Storey's Gate, S.W., 6 p.m. Thomas Lowe Gray Lecture. "Progress in Marine Engineering." Eng.-Vice-Admiral R. W. Skelton.

**Institution of the Rubber Industry.**—Monday, January 6th. Engineers' Club, W.C.2. "Electro-deposition." Mr. W. A. Williams.

**Electrical Power Engineers' Association (London Local Technical Group).**—Tuesday, January 7th. Institution of Electrical Engineers, Savoy Place, W.C., 7.15 p.m. Joint meeting. "The Place of Women in the Electrical Industry." Miss Haslett.

**(Birmingham Local Technical Group).**—Tuesday, January 7th.—Chamber of Commerce, Birmingham. "Large Power Switching." Dr. Garrard.

**Electrical Society of Glasgow.**—Tuesday, January 7th. Reid's Smoke Room, 30, Gordon Street, Glasgow, 7.30 p.m. "The Electric House." Mr. T. Ingram Craig.

**Television Society.**—Tuesday, January 7th. Engineers' Club, W., 8 p.m. "Photographic Problems of Picture Telegraphy." Mr. W. S. Newton.

**Physical Society.**—January 7th, 8th & 9th. Imperial College of Science, South Kensington, S.W. Annual exhibition.

**Institution of Railway Signal Engineers.**—Wednesday, January 8th, Institution of Electrical Engineers, Victoria Embankment, W.C., 6 p.m. "Some Further Electrical Details of the Bow Road-Barking Signalling." Mr. H. H. Dyer.

**Institution of Heating and Ventilating Engineers.**—Wednesday, January 8th. Swedenborg Hall, Hart Street, Bloomsbury, W.C. 7 p.m. "Combustion, Wind and Flue Equipment." Mr. C .A. Masterman.

**Institute of Fuel.**—Wednesday, January 8th. Burlington House, W. 6 p.m. "Fuel Economisers with special reference to their construction, materials, and recent developments." Mr. O. Kubalek.

**Institution of Electrical Engineers.**—Thursday, January 9th. Institution, Savoy Place, W.C. 6 p.m. "Recent Developments of 3-phase Transmission Lines and Feeders." Messrs. T. W. Ross and H. G. Bell.

**(Mersey & North Wales (Liverpool) Centre).**—Monday, January 6th. University, Liverpool, 7 p.m. "Talking Films." Mr. S. S. A. Watkins.

**(North-Western Centre).**—Friday, January 10th. Free Trade Hall, Manchester, 7 p.m. Faraday Lecture. "Broadcasting by Electric Waves." Captain P. P. Eckersley.

**(Dundee Sub-Centre).**—Thursday, January 9th. University College, Dundee, 7.30 p.m. "Lubrication." Mr. G. H. Chalmers.

**(Meter & Instrument Section).**—Friday, January 3rd. Institution, Savoy Place, W.C., 7 p.m. "Instrument Transformers." Mr. J. G. Wellings and Mr. C. G. Mayo.

**(North-Eastern Students' Section).**—Friday, December 10th, Armstrong College, Newcastle-on-Tyne, 7.15 p.m. Ordinary meeting.

**Royal Society of Arts.**—Friday, January 10th. John Street, Adelphi, W.C. 4.30 p.m. "The Economic Progress of India." Sir Basil P. Blackett.

**Junior Institution of Engineers.**—Friday, January 10th. 39, Victoria Street, S.W. 7.30 p.m. "The Track Circuit in Railway Signalling." Mr. H. J. N. Riddle.

**Association of Supervising Electrical Engineers.**—Saturday, January 11th. Children's party.

**Assocation of Mining Electrical Engineers (Western Sub-Branch).**—Saturday, January 11th. Swansea. "Some Consideration re Power Cost." Mr. S. T. Richards.

**Institution of Automobile Engineers.**—Friday, January 17th. Glasgow. "Electrical Equipment of Automobiles." Mr. D. W. Angus.

# The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following:—

ICYGLASS refrigerators.
Electric fuel pumps for motor cars.
VIVOS "right way" vacuum cleaners.
B.Q. Ozonisers.
40-volt lamps of small candle-power for electric vehicle use.

We also desire the present address of the Abba Electrical Co.

# Notes.

## A Large Oil Circuit-Breaker.

When it is practicable so to increase line insulation as to reduce flashovers to the minimum, it is also necessary to increase the size of the oil circuit-breakers and other equipment at sub-stations. Such conditions caused the Public Service Co., of New Jersey, U.S.A., to order from the Westinghouse Electric and Manufacturing Co. a large oil circuit-breaker to install in its Roseland sub-station. It is undergoing a test in the Westinghouse plant at East Pittsburgh, and does not differ greatly (only in size) from the standard "G" type. Its overall height is 25½ ft.; the internal diameter of each tank is 10 ft., and the assembled pole units and mechanism are 45 ft. wide. The tanks hold 22,000 gal. of oil and are insulated for 250 kV, and the weight of the complete unit is 141 tons. The breaker has a continuous current rating of 600 amperes and an interrupting rating of 8,000 arc-amperes at 220 kV, or 3,000,000 arc kVA. One solenoid mechanism operates the three poles at high speed, and is mechanically and electrically trip-free in any position of the closing stroke, which prevents pumping and the possibility of the breaker being held in against a short-circuit. The arcing contacts are of the bayonet rotating high-speed type. The condenser terminal bushings are tapped for a potential device that is used in place of a metering transformer. Multi-ratio bushing-type current transformers are used for metering and relay operation, giving ten ratios from five leads.

## Educational.

A course of ten lectures will be given on Tuesday evenings, commencing on January 14th, by Mr. G. S. W. Marlow, on "Law and Industry," at the Sir John Cass Technical Institute. Particulars of these and other courses in physics, mathematics, chemistry, and metallury can be obtained from Mr. G. Patchin, principal of the Institute. (See our advertisement pages to-day.)

## Water Softening.

The softening of water by the base-exchange "Zeolite" process is assuming increasing importance. A publication of the Department of Scientific and Industrial Research (Water Pollution Research, technical paper No. 1) summarises the existing knowledge of the subject. Following a brief historical introduction, the technique of the process is described and its advantages and disadvantages, in comparison with the older lime-soda process, are set out. The preparation of base-exchange materials is briefly described, and the concluding sections, dealing with the theory of the process, serve to indicate the incompleteness of existing knowledge in this direction.

## A Kinema Lighting Scheme.

With reference to the article under the above heading in our issue of December 20th, p. 1114, describing the installation of the new "Commodore" Theatre, Hammersmith, we are asked to correct the statement that the whole of the auditorium lighting is dimmer controlled by means of a single-tier dimmer bank, &c., and to point out that the centre unit and the whole of the under balcony units are controlled by means of a motor-driven dimmer manufactured by Mickelwright, Ltd.

## B.S.S. for Three-phase Switchgear.

The publication, No. 195, 1929, which has just been issued by the British Engineering Standards Association, is a companion specification to No. 194, published in 1926, which dealt with switchgear equipment for direct-current circuits. These schedules for 3-phase a.c. circuits have been drawn up with a view to specifying the least amount of apparatus which will control the machine or circuit, and yet avoid fire hazards, discontinuity of supply and danger to the operator. In many cases, according to the nature of the service, size of plant, and other circumstances, additional apparatus will be required or desired, and to this end the appropriate additions to the various equipments are separately scheduled as "Optional

extra Equipment," from which a selection should be made after consideration of the requirements of the individual case. The necessary apparatus for earthing the neutral point of a three-phase system, either solidly or through a resistor, is scheduled, and certain requirements are laid down regarding the accessibility of switchboards for cleaning and examination. As in the case of B.S.S. No. 194, the schedules are accompanied by a series of diagrams illustrating each type of circuit for which standard equipment is specified. Incidentally, these diagrams afford an excellent illustration of the manner in which the British standard symbols for electrical purposes may be employed on schematic diagrams.

Copies of the new specification may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

## B.S.S. for Charging Plugs and Sockets.

In view of the increasing use of electric battery vehicles and the more adequate provision of charging facilities, particular interest attaches to the revision of B.S.S. No. 74, dealing with charging plugs and sockets, which has just been issued. This new specification differs from the previous edition mainly in the fact that the plugs and sockets are rated for use on circuits up to 250 volts, whereas in the old specification the plugs were suitable for use on circuits up to 120 volts only. Considerable attention has been paid to the means of securing interchangeability, and the gauges have been re-designed for this purpose. The specification does not attempt to lay down a rigid design, and only the dimensions essential to ensure interchangeability are rigidly standardised. Tests are laid down to ensure the employment of satisfactory insulating material, and the means for gripping the cable are also referred to.

Copies of this specification may be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

## Electrical Plant in Gasworks.

Mr. W. E. Stephenson, of South Bank (near Middlesbrough), addressed the Yorkshire Junior Gas Association at Leeds recently on "Electrical Plant in Gasworks." Mr. Stephenson is engaged in gasworks in which electrical plant is extensively used for driving telphers and conveyors, and providing motive power for stoking and other machinery in the production of gas and by-products. In the spirited discussion which followed, opinion was general that the gas industry should not close its eyes to the advantages of electric power, its cleanliness and convenience, particularly the absence of dirt and dangerous belting. A Leeds speaker who used electrical power a good deal spoke of its remarkable reliability, but emphasised the fact that the way to avoid breakdowns was by systematic care and inspection. Safety devices, against the ordinary risks of the human element, were more readily adaptable to electrical plant than to any other form of motive power. A Sheffield speaker said he would not like to be without electric motors in gasworks to-day. In his place they generated electricity by gas engines for the maximum load of week-days, but at week-ends used the ordinary town's supply through a rotary convertor. A Wakefield speaker was not prepared to admit that electricity would do everything in the way of motive power in a gasworks better than methods previously used, but he admitted that electrical plant was in use to some extent in his works with satisfactory results. His experience was that it was cheaper to generate in the works than to buy from the town's supply, and he particularly favoured the utilisation of waste heat for electricity generation. A large works had the advantage over small or medium-sized works of being able to make it worth while to keep a permanent skilled electrician for maintenance and repairs. He did not favour changing over from steam to electricity for the driving of exhausters. Another speaker compared efficiency figures, showing that gas was about 1.7 times as efficient as steam in the generation of electricity in gasworks, but that advantage might be counteracted by the price of gas, as compared with the cost of steam raised by low-grade coal. The manager of a Bradford gasworks run on very modern lines and equipped with a good deal of electrical plant, was not particularly elated about electric motors, but he had not had the plant in his charge long enough to feel justified in making any real comparison. They had had several breakdowns of small motors owing to the effects of damp. Some motors up to 150 h.p. had given no trouble whatever, but they were rather new. Another Leeds gasworks' manager suggested that the desirability of adopting the electric drive was largely dependent on the disposition of the machinery in the particular works concerned. At his own works he would not be inclined to recommend electric driving in the retort house, where gas engines, installed as long ago as 1904, were driving the whole plant with great efficiency. The hydraulic stoking machinery was also working very well, but he agreed that hydraulic power was inclined to be messy, with leaky water glands, &c., and if he were recommending a change for the future he would probably favour electrical driving in that case. For telpherage he knew of nothing that could be substituted for the electrical drive. In isolated coal-breaker pits, down which one had to carry steam piping, steam power might advisedly be replaced by electricity. They of the gas industry would all like gas power to be universal in use, but nothing was to be gained by failing to adapt any other kind of power if satisfied that it was cheaper or more convenient in use. Looking at the matter purely from a financial aspect, a factor which had to be borne in mind, which some gas engineers might forget, was that the more electrical driving they adopted the more they were likely to flood the market with coke and coke breeze, which they would otherwise have been using in their own works, and thereby tend to bring down the selling value of that commodity, a factor which had to be reckoned against whatever financial gain might be expected from the electrical installation. Mr. Stephenson, replying to the discussion, suggested that more use might well be made of the surplus energy produced at gasworks in supplying a balance of energy to electrical undertakings. He agreed with some of the views as to the limitations of electrical power on certain gasworks plant, but contended, without hesitation, that in the matter of convenient distribution of power over a works electricity was superior to any other form; and there was no form of power to which the application of safety devices was so easy as electrical equipment.

## Lighting of Durham Cathedral.

In very few cathedrals and churches in this country has advantage been taken of the pleasing effects obtainable by the introduction of a certain amount of colour. In Durham Cathedral, where the light is tinted to a warm yellow, it greatly enhances a beautiful interior. This effect is produced by means of over 80 lighting units installed in the clerestory and triforium of the building. Each unit comprises a gasfilled projector lamp mounted in a suitable case with a silvered-glass reflector of unique form, and a suitable tinted-glass cover. The lamps are concealed from direct vision, and the units are so mounted and finished as to be as inconspicuous as possible in daylight. By means of these units the light is controlled in both direction and colour. Owing to the manner in which the light is controlled the resultant illumination is entirely adequate for reading small print, although the units are situated 50 ft. or more from the points where the lighting is utilised. The lamps are controlled by electrically-operated switches placed in proximity to the lighting units concerned, and these, in turn, are operated by push buttons fixed in the choir stalls. The connections between the push buttons and switches consist of a number of small wires, made up into a cable, each button having its own independent wires. The push buttons are duplicated on each side of the choir stalls, 112 buttons in all being installed. This method of lighting from concealed sources has enabled the building to be lighted without employing elaborate and obtrusive electroliers. The lighting was designed by the B.T.-H. lighting engineers' department (now incorporated in the commercial lighting department of the Edison Swan Electric Co., Ltd.) in collaboration with Mr. R. A. Cordingley, the cathedral architect, the apparatus being supplied by the British Thomson-Houston Co., Ltd. The wiring was carried out by Messrs. Reid, Ferens & Co., of Sunderland, and the distribution arrangements by the Newcastle Electric Supply Co.

**Interior Lighting of Durham Cathedral.**

## Simplified Engineering Course for Women.

A short course of simple lectures and practical demonstrations, commencing on Tuesday, January 7th, 1930, has been specially arranged by the Borough Polytechnic Institute in conjunction with the Women's Engineering Society, for women who desire to become qualified as candidates for inspectorships of factories, welfare supervisors, administrative and managerial assistants in industry, and secretaries to engineers. The fee for the complete course is £1.

## Some Distribution Troubles.

In the article published in our issue of December 20th under the above heading, the title of fig. 4 should have appeared under fig. 5 and *vice versa*.

## The Electrical Association for Women.

A branch of the Electrical Association for Women is to be opened at Bradford early in the new year. Miss Eva Moss, of 178, Manningham Lane, Bradford, daughter of Mr. Harry Moss, hon. secretary of the Bradford E.D.A. Circle and a leading member of the Bradford Publicity Club, has undertaken the task of voluntary organiser, and the inaugural meeting is to be held at the Bradford Mechanics' Institute on the evening of January 30th.

## Bearings for Line-Shafting.

The shaft is the essential element concerned in power transmission and, even with the widespread adoption of electric driving, it must continue to be employed on a very extensive scale. In many large establishments using mechanical transmission, or in those electrically driven throughout on the group system, the shafting in use, varying from 2 to 4 in. in diameter, may have a total length of several miles. In such a case thousands of bearings are required, and it is therefore important that the loss of power due to friction should be reduced to a minimum. In modern practice this is accomplished either by means of "plain" bearings, in which case special attention is devoted to proper methods of lubrication, or by the use of ball- or roller-bearings. The merits and limitations of each of these two main types of bearings for power shafting are discussed in a paper recently read by Prof. G. F. Charnock before the Institution of Mechanical Engineers in London.

There is a deeply-rooted conviction that reliability and freedom from breakdowns are of far greater importance than a saving in power, and for this reason the plain bearing is still regarded with favour in many quarters. Should a brass require replacement, it may be done with very little trouble without dismantling. The ring-oiled bearing requires very little oil, and will run for about three months under normal conditions without attention.

On a long line of shafting if a ball-bearing fails, it is impossible to replace it without taking down at least one length of shaft and removing the couplings and pulleys. If the bearings are of ample size, correctly mounted, properly lubricated, and kept free from dirt, failure should be a rare occurrence, and an important point in favour of anti-friction bearings is cleanliness. The small quantity of grease required is easily retained in the casing, and is rarely productive of any inconvenience. It need not, as a rule, be replaced more than once or twice a year, and the attention required is therefore very small.

Anti-friction bearings possess the great advantage that as the resistance at starting is practically the same as when running, the reserve of power usually provided for starting with plain bearings becomes unnecessary.

The running friction of ball- and roller-bearings may not differ greatly from that of plain bearings when the latter are perfectly lubricated, but it must be admitted that this condition does not, in many instances, admit of easy fulfilment, compared with which ball- and roller-bearings show to great advantage and will effect a considerable saving in power. The friction of plain bearings varies widely with changes in load and temperature and, as such changes are liable to take place during ordinary running, the coefficient of friction cannot be regarded as a constant quantity. With anti-friction bearings the coefficient is practically constant within the limits which occur with line-shafting, and, moreover, it is not affected by changes in temperature. The saving in the transmission losses due to friction which may be effected by the use of ball-bearings is frequently quoted as 80 or 90 per cent. This is an extreme figure, based on the results of laboratory experiments made to determine the coefficient of friction, and it should be noted that it can only be taken to include shafting friction, and not the total loss. The actual saving in power depends very largely on the efficiency of the installation, and will be greatest when the efficiency is low. In a discussion before the Institution in 1928, allusion was made to some experiments carried out at Crewe works on a length of shafting which had been fitted with ball-bearings; it was driven by a 21-h.p. motor, which, with the plain bearings previously in use, was worked to its full capacity. The saving effected by the use of ball-bearings was as follows:—

| | | |
|---|---|---|
| Current taken to start up shafting | ... | 22.0 per cent. less |
| Average current taken when running | | 32.4 " " |
| Current taken to run shafting light | ... | 30.0 " " |

The saving effected in running shafting when work was being done amounted to 4.6 h.p. out of 21 h.p., or, say, 22 per cent. It is not easy to carry out comparative tests on an actual installation, but in practice the saving may be from 15 to 35 per cent., according to conditions.

## Kinema Safety Device.

A new safety control attachment for modern high-power kinematograph projectors, which reduces any possible fire hazard during projection, has been introduced in Glasgow. The Anchor Steamship Co., which took up the proposition in the city, is contracting for the installation of the new device on each of the projectors carried on its vessels. The attachment is a simple electro-magnetic shutter mounted on the cone of the lamp-house, which automatically cuts off the light from the film and stops the motor when any defect in the machine causes the film to slow down to a dangerous speed, or break during projection.

## Magnetic Properties of Nickel-Iron and Nickel-Cobalt-Iron Alloys.

Determinations have been made of the intensity of magnetisation of numerous alloys in the cobalt-iron, nickel-iron, nickel-cobalt, and nickel-cobalt-iron series. The main conclusions are as under:—

In the nickel-iron series the magnetisation curve of the reversible alloys has a form similar to that of pure iron or nickel: the irreversible alloys are much less easily magnetisable. There is a marked minimum in the concentration/magnetisation curve at 30 per cent. of nickel and two maxima, one at 5 and the other at 45 per cent. of nickel.

Nickel-cobalt alloys containing up to 70 per cent. of cobalt, which consist of a homogeneous γ-solid solution, are easily magnetisable, but magnetisation is more difficult in the case of the higher cobalt alloys, which have a hexagonal close-packed lattice. The effect of carbon on these alloys is very sharply marked.

As cobalt is added to the reversible iron-nickel alloys their permeability gradually decreases, reaches a minimum at about 50 per cent. of cobalt and subsequently shows a gradual increase. The low permeability of the iron-nickel alloy containing 30 per cent. of nickel gradually increases with increasing cobalt. The small maximum occurring at 5 per cent. nickel in the binary nickel-irons is gradually eliminated by increasing additions of cobalt.—*The Nickel Bulletin.*

## Appointments Vacant.

Mains engineer for Southend-on-Sea Corporation. Installation superintendent for Barking Town Urban District Council. Shift engineer for East Grinstead Urban District Council. Draughtsman for Birmingham Corporation Electric Supply Department. Junior assistant for Winchester Electricity Department. Low-voltage jointer for York City Council. Lady showroom assistant and demonstrator for Fulham Borough Council Electricity Department. General manager of the Electricity Department for the Johannesburg (S.A.) City Council. Assistant mains engineer for Hammersmith Borough Council. Senior technical assistant and technical assistant for Admiralty Compass Department, Slough. Four grade "B" male clerks for Leyton Electricity Department. (See our advertisement pages to-day.)

## Engine Pressure Indicators.

At a recent meeting of the Paisley Association of Electrical Engineers, Mr. Norman Young delivered a lecture on "A New Electrical Method of Determining the Pressure in Engine Cylinders." The lecture was illustrated with slides, showing diagrams indicating steam pressures in various types of engines, compressors, pumps, &c. Mr. Young had also on view an electrical valve for giving indicator diagram readings, and the working of the valve was fully explained.

## Cleaning Condensers by Chlorination.

According to *Power* (December 17th, 1929), the Public Service Electric & Gas Co. has obtained successful results from treating circulating water with chlorine gas at its Kearny (N.J.), U.S.A., station. Slime has hitherto seriously affected the vacuum obtainable and made it necessary to close down each of the 47,250-kW turbo-generators every week in summer, and every fortnight in winter, for cleaning the condenser tubes. The condensing water has a low oxygen and a high salt content. Comparative tests of the two methods were made, and these indicated an appreciable improvement in vacuum with the use of chlorine, even though the other condenser was regularly taken off for cleaning. Curves are given showing the relative heat transfers over a year. The principle of operation is that the chlorine prevents the formation of slime by destroying algæ growths of a jelly-like nature, which act as a binding agent for mud and silt. Its use has the drawback of risks due to leakage of the gas, which, although not poisonous, exercises a choking effect, and this gave some trouble in the early stages. Future installations will be kept outside the main building.

## Electrolytic Deposits of Chrome.

Electrolytic deposits of chrome have recently attracted a considerable amount of attention in metallurgical industries owing to the superiority of chrome from the points of view of hardness, resistance to wear and friction, immunity from effects of chemical influence, even in the presence of sulphuric vapours at high temperature, and of the facility of making satisfactory deposits much thinner than with the other metals usually employed in electrolysis These deposits have recently been adopted for high-class automobiles, for instruments of precision, and for lighting apparatus. So far the treatment has presented many difficulties, apart from the question of high cost, owing to the necessity of constant attention and specialised labour. According to the *Révue des Questions Scientifiques* the anode consists of iron or lead, and the electrolyte is formed of chromic acid concentrated to 250 grammes per litre, with the addition of various chromic salts, sulphates, chlorates, nitrates, or borates. A very high density of current is employed, generally between 15 and 25 amperes per square decimetre, or about 25 times more than that which is used with nickel or silver, and the bath is maintained constantly at a temperature of 50 deg. C. When the cost and difficulties of electro-plating with chrome have been reduced it is expected that the treatment will be developed extensively for machine bearings exposed to high speeds and to considerable wear, for which precise adjustment is important.

### Copper Economy in Russia.

In a recent issue of the Russian journal *Elektritschwesto*, Ing. D. R. Friedmann gives some details of the methods which are being adopted by the Soviet Russian Government to economise in the consumption of copper, and consequently reduce national imports. The author states that the country's copper requirements during the fiscal year 1927-28 amounted to 50,370 tons, of which 24,500 tons, or about 49 per cent., was needed for electrical purposes, while during the present year he estimates that the Russian electrical industry will require 27,400 tons. As a means of economising in copper, it has been decided to increase the voltage of h.p. transmission lines from 220 to 380 kV; that of 35 kV lines, when possible, to 60 kV; and those of from 2,000 to 3,000 V to 6,000 V. For low-voltage mains iron wire is to be used instead of copper. With a similar object aluminium and iron are now being used instead of copper in the manufacture of a variety of electrical apparatus, while galvanised sheet iron is to be used instead of brass for many installation fittings.

### Annual Report of the Electricity Commissioners.

The ninth annual report of the Electricity Commissioners has been published this week (H.M. Stationery Office, 3s.). The report relates to the period April 1st, 1928, to March 31st, 1929.

### Electrification of the Pennsylvanian Railway.

According to the report of the Electrification of Steam Railroads Committee of the National Electric Light Association (U.S.A.), it is intended to electrify the entire freight and passenger service between New York and Wilmington, Del. The project covers 325 miles of line (1,300 track miles) and will cost more than £20,000,000 to be spread over seven or eight years. It is estimated that 60 per cent. of this sum will be spent on catenary, transmission line, and sub-station construction, and 40 per cent. on rolling stock, which includes 165 passenger and 200 freight locomotives. The number of passenger trains to be operated by electric locomotives will be 318 and as multiple-unit trains 218. The reasons for electrification, given by Mr. W. W. Atterbury, president of the railway company, are as follows:—

The immediate factors which influenced the decision to proceed with electrification at this time were as follows:

1. The greater economy of electric traction as compared to steam operation in dense traffic territories;
2. The growth of the southern passenger business;
3. The increasing density of both freight and passenger business on our eastern lines and the probability that in the future more rapid movement would be required;
4. The desirability of utilising the advantages of electric traction in connection with the construction of our new passenger terminals at Philadelphia and Newark;
5. The desirability of building a locomotive that would meet the requirements from the standpoint of weight of train, speed, and reliability that we believe will have to be met in this territory in the next twenty years;
6. The probability that the project, if started now, could be completed with a less total expenditure, all matters considered, than if started at a later date.

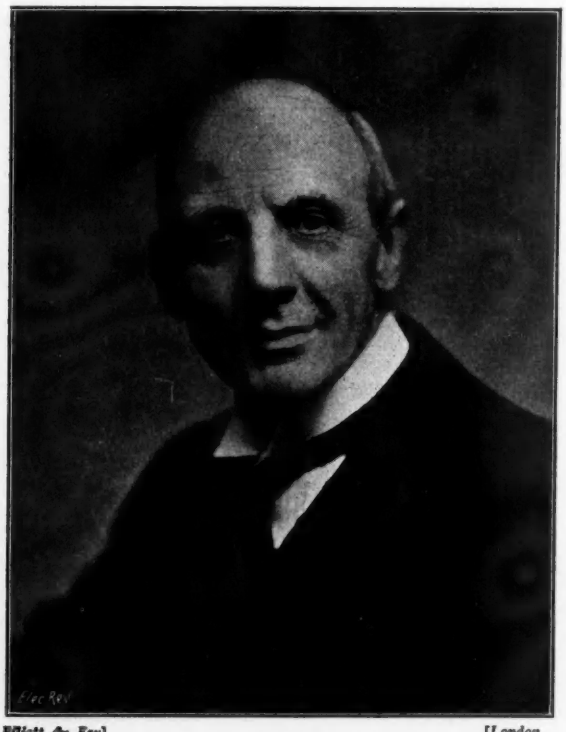
### Tramcar Braking Development.

According to the *Daily Express*, two engineers employed by the Birmingham Corporation Tramways Department have just patented a device which, it is claimed, may revolutionise the braking systems of motor vehicles. The invention is claimed to permit any existing type of brake to be applied electrically and more efficiently than by foot or hand. The operating current is supplied from a motor-car accumulator or a special generator. The current consumption is stated to be little more than that for the operation of an electric horn.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.**

**New Year Honours.**—We tender our hearty congratulations to Mr. ARCHIBALD PAGE, Chief Engineer and Manager to the Central Electricity Board, and a past-president of the Institution of Electrical Engineers, upon the distinction of Knight Bachelor which is conferred upon him in the New Year Honours List. We are sure that the whole of the electrical profession and industry will regard with satisfaction the conferring of this high honour upon one who is, and has been for so long a period, so closely connected with electrical supply development. Fuller accounts of Sir Archibald's career appeared in the ELECTRICAL REVIEW for April 8th and October 14th, 1927.



*Elliott & Fry* [*London*

**Sir Archibald Page.**
Who appears in the New Year's Honours List.

To the following who also appear in the New Year Honours we tender equally cordial congratulations:—

The Foreign Office list contains the name of Sir MALCOLM ROBERTSON, K.C.M.G., K.B.E., who recently retired from the position of Ambassador to the Argentine Republic to which he was appointed when the Buenos Aires Embassy was created. He is promoted to Knight Grand Cross of the Order of St. Michael and St. George. Sir EDWARD T. F. CROWE, C.M.G., Comptroller-General of the Department of Overseas Trade, is promoted Knight Commander in the Order. Mr. C. J. KAVANAGH, who recently retired from the post of Commercial Secretary at Berlin, is made an Officer of the Order of the British Empire. Mr. E. E. ROGERS, A.M.I.E.E., Examiner of Technical Accounts, Electrical Engineering Department, Admiralty, is made a Member of the Order. The Companionship of the Order of St. Michael and St. George has been conferred on Mr. J. S. PITKEATHLY, C.I.E., Director of Electrical Undertakings, Ceylon. Lieut.-Col. HENRY W. G. COLE, C.S.I., Director, Exhibitions Department, D.O.T., is knighted.

Mr. W. J. WILES has resigned from the board of Messrs. S. G. Leach & Co., Ltd., and joined the staff of Philips Lamps, Ltd., on January 1st.

Mr. F. H. BEVAN has been appointed manager of the Joint Branch of the London Electric Wire Company and Smiths, Ltd., and the Liverpool Electric Cable Co., Ltd., at Leeds. Mr. Bevan was, until his appointment, outside representative of these companies at Manchester.

Mr. W. H. MILLATT has resigned the position of manager and superintendent of the Chester Corporation electricity showrooms. A successor is in course of being appointed.

Mr. T. R. WARREN, B.A., B.Sc., A.M.I.E.E., technical assistant to Mr. D. Maxwell Buist, M.I.E.E., chief electrical engineer, Synthetic Ammonia & Nitrates, Ltd., has joined the staff of the Metropolitan-Vickers Electrical Co., Ltd., Manchester. He was presented with a wristlet watch by his fellow engineers at a recent smoking concert, the presentation being made by Mr. Buist.

The *Industrial Australian and Mining Standard* reports that Mr. WILLIAM JAMES CLEARY, general manager of Tooth & Co., Ltd., Sydney, has been appointed to the position of Chief Commissioner for Railways in New South Wales at a salary of £7,500 a year. Mr. Cleary is a business man of outstanding ability, and is an authority on business organisation.

According to the New Zealand journals Mr. E. F. HOLLANDS, M.I.E.E., late manager of the Timaru Municipal Electricity Department, has been appointed engineer-manager to the Hutt Valley (N.Z.) Electric Power Board, at a salary of £1,000 per annum.

Mr. E. MARSDEN, electrical engineer to the Newmill Urban Council, has been appointed borough electrical engineer of Louth.

At a recent meeting of the Leeds Tramways Committee the chairman intimated that Mr. ANDREW DAGGETT, traffic superintendent, was shortly retiring on superannuation, and the committee expressed its appreciation of Mr. Daggett's long and valuable service.

Mr. F. H. EBERL, who, after ten years' service as resident engineer with Messrs. Siemens Bros. & Co., Ltd., Outside Contracts Department, resigned his appointment on his return from Athens, has now taken up the position of mains engineer to the Leatherhead and District Electricity Co., Ltd.

The Barking Urban Council has appointed Mr. A. B. CATLING as assistant electrical engineer for a probationary period of a year. Mr. Catling has been mains superintendent.

Mr. ROBERT ILLINGWORTH, A.M.I.E.E., who is leaving Cardiff to take up the position of deputy electrical engineer at Plymouth, was last week presented by the workmen and officials of the power supply undertaking of Messrs. Cory Brothers & Co., Ltd., with an inscribed walnut clock. He also received an all-mains radio-gramophone set from the officials of Messrs. Cory Bros., Ltd., and a silver cigarette cabinet inscribed with the signatures of the donors from his many friends at Cardiff.

Sir A. V ROE has joined the board of Runbaken Motor and Electrical Accessories, Ltd.

On December 23rd Mr .S. G. MARSTON, general manager and engineer of the Stockton-on-Tees Corporation electricity works, was married to Miss Dorothy Elliott, of Stockton, and was presented with a canteen of cutlery from the office and works staff of the Electricity Department.

Owing to ill-health, Mr. T. M. COLSON has asked to be relieved of his duties as chief engineer and manager of the Surbiton electricity supply undertaking. He therefore ceased to hold that position on 1st inst., but he will act as advisory engineer. Mr. Edgar S. Saunders, O.B.E., M.I.E.E., has been appointed chief engineer and manager, and all future communications should be addressed to him.

**Obituary.**—MR. J. ALLWORK.—The death is announced at the age of 81 years of Mr. J. Allwork, who was for many years a director of A. & C. Bridgland, Ltd., electrical and general engineers, East Grinstead, Sussex.

Mr. C. S. LEPOER TRENCH.—We regret to learn from the *Journal* of the British Empire Chamber of Commerce in the United States of America of the death of Mr. Charles S. LePoer Trench, President of the Chamber. Mr. Trench, who was born in England in 1854, was an outstanding figure in the United States metal trade and he was editor of the *American Metal Market*.

LT.-COL. M. CRADOCK.—We regret to announce the recent death, at the age of 70, of Lt.-Col. Montague Cradock, C.B., C.M.G., associated as a director with the Metropolitan-Vickers Electrical Co., Ltd., since its early days in 1902. Col. Cradock endeared himself to everybody connected with the company, staff, and workpeople by the unfailing interest which he always showed in their welfare. Beginning his military career in the Durham Fusilier Militia in 1877, he served through the Afghan campaign, commanding the 2nd New Zealand Contingent, and later the 3rd Mounted Infantry Corps, and the Bushmen's Brigade in the South African war. In August, 1914, he raised the 2nd King Edward's Horse and commanded that unit until he retired in August, 1918. The interment took place in the family vault at Gilling, near Richmond, Yorks., the casket being made of oak grown on his Harforth estate, and he was conveyed to the churchyard on one of his own farm wagons.

MR. C. J. JAMESON.—The funeral took place in Edinburgh, on December 27th, of Mr. Charles J. Jameson, who for many years had been manager of the factories of the British Aluminium Co. at Kinlochleven and Lochaber. The funeral was attended by members of the staff, and the company was represented by Mr. E. E. Eccles, assistant general manager.

**Will.**—MR. WILLIAM BANNISTER, J.P., the late chairman of the Chloride Electrical Storage Co., Ltd., who died on October 1st at the age of 81, left estate valued at £128,418 gross (£119,146 net personalty).

# Financial Section.

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Charges, Transactions in Stocks and Shares.**

## New Companies Registered.

**John Linton & Co., Ltd.**—Private company. Registered December 23rd. Capital, £300 in £1 shares. Objects: To acquire the business of an electrical and mechanical engineer heretofore carried on by J. R. W. Linton, at Sale, Cheshire. The permanent directors are: J. R. W. Linton, Newstead, Northenden Road, Sale, Cheshire; H. L. Wilding, Grove Villa, Llandrindod Wells; Jessie A. L. Linton, Newstead, Northenden Road, Sale, Cheshire. Registered office: Newstead, Northenden Road, Sale, Cheshire.

**Radio By Wire, Ltd.**—Private company. Registered December 20th. Capital, £3,000 in £1 shares. Objects: To construct and maintain wireless signal and receiving stations, and to carry on the business of electricians, radio engineers, &c. The first directors are: N. Wallis, 133, Goddard Avenue, Hull, radio manager; A. G. Peck, 188, Coltman Street, Hull; W. H. Shipley, 107, Westbourne Avenue, Hull, general engineer; W. A. Cutting, 19, Malm Street, Hull (all permanent). Secretary: A. G. Peck. Registered office: Exchange Court, Bowlalley Lane, Hull.

**Wireless & Gramophone Service Co., Ltd.**—Private company. Registered December 30th. Capital. £600 in £1 shares. Objects: To acquire the business of a dealer in wireless and electrical installations and sundries, gramophones and musical instruments carried on by P. J. Moore at 10 and 12, Chapel Street, Barwell, Leicester, as the Wireless and Gramophone Service Co. The first directors are: P. J. Moore, wireless dealer; Mrs. F. Moore and Kathleen T. Moore, all of 10, Chapel Street, Barwell, Leicester (all permanent).

**Dormor & Co., Ltd.**—Private company. Registered December 28th. Capital, £4,000 in £1 shares. Objects: To carry on the business of electrical, wireless and gas engineers and factors hitherto carried on by Dormor & Co. at 217c, Old Christchurch Road, Bournemouth. The first directors are: W. C. Hands, 20, Northwick Avenue, Harrow (director, Whitworth Electric Lamp Co., Ltd.); O. A. Plimsaul, 217c, Old Christchurch Road, Lansdowne, Bournemouth; A. E. Dawson, Frinton, Sefton Avenue, Mill Hill, N.W.7 (director, Wenham Lighting Corporation Ltd.). Qualification: Two shares. Registered office: 217c, Old Christchurch Road, Lansdowne, Bournemouth.

**Mobilectric, Ltd.**—Private company. Registered December 23rd. Capital, £150 in 1s. shares. Objects: To carry on the business of automobile, electrical and mechanical engineers, &c. The directors are: F. J. Matson, 18, Queen's Place, Otley, Yorks., automobile electrical engineer (permanent managing director); and Mrs. A. M. Matson, 18, Queen's Place, Otley, Yorks.

**Radio Finance Co., Ltd.**—Private company. Registered December 24th. Capital, £1,000 in £1 shares. Objects: To carry on business as financiers, concessionaires, brokers, agents for and manufacturers of and dealers in radio, electrical scientific, and mechanical apparatus and appliances, to lend money, to finance hire-purchase agreements in respect of the above, &c. The first directors are: May E. Brenchley, confectioner, and C. C. Brenchley, radio and electrical engineer, both of 36, Nettherall Road, Doncaster. Registered office: 5, Priory Place, Doncaster.

**Light, Power & Music, Ltd.**—Private company. Registered December 20th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electricians, mechanical and marine engineers and manufacturers, dealers in electricity, motive power, heat and light, wiring contractors, concert hall and kinema proprietors, &c. The subscribers (each with one share) are: W. S. Gibson, 143, Muswell Avenue, N.10, solicitor; E. P. Swan, Astrea Forde, Mount Avenue, Westcliff-on-Sea,

accountant; S. F. Woodington, 32, Chalkwell Gardens, Leigh-on-Sea, commercial agent. The first directors are to be appointed by the subscribers. Registered office: 22 & 23, Laurence Pountney Lane, Cannon Street, E.C.

**Nassak Manufacturing Co., Ltd.**—Private company. Registered December 18th. Capital, £100 in £1 shares. Objects: To acquire from S. W. Nassauer the interests and benefits of the trade mark "Nassak" and to carry on business as wireless factors and manufacturers, &c. The subscribers (each with one share) are: J. H. Bulman, 41, Kimberley Avenue, Seven Kings, Ilford, merchant; J. Mitchener, Great Buckland, Luddesdown, Kent, merchant. The first directors are to be appointed by the subscribers. Qualification: One share. Secretary: J. H. Bulman. Solicitors: C. L. L. Foakes, 221, Bishopsgate, E.C.2.

**Perfection Loud-speaker Wireless Co., Ltd.**—Private company. Registered December 21st. Capital, £1,100 in 1,000 ordinary shares of £1 each and 2,000 deferred shares of 1s. each. Objects: To acquire the business of a manufacturer of and dealer in wireless apparatus carried on by M. E. Elliott at Gosford Road, Beccles. The first directors are: F. B. Goodchild, A.M.I.M.E., Shortmead, Hadleigh Road, Leigh-on-Sea; H. S. Alexander, 34, Hall Plain, Yarmouth, C.A.; E. Beck, 21, Fitzgeorge Avenue, West Kinsington, W.14 (director of Amalgamated Cotton Mills Trust, Ltd.); J. Craft, 79, King's Road, Westcliff-on-Sea, engineer. Registered office: 22, Birchin Lane, E.C.2.

# Official Returns of Electrical Companies.

**Thomas Wilkinson (Arnside), Ltd.**—Equitable mortgage on electrical works and hereditaments at Arnside, dated December 9th, 1929, to secure all moneys due or to become due from the company to Martin's Bank, Ltd., not exceeding £2,500.

**Petersfield Electric Light & Power Co., Ltd.**—Satisfaction on December 23rd, 1927, of two debentures dated August 5th, 1924, and August 4th, 1925, and registered August 14th, 1924, and August 15th, 1925, respectively. (Notice filed December 17th, 1929.)

**Wireless Apparatus, Ltd.**—Capital, £2,000 in 1,000 "A" shares of £1 each, and 8,000 "B" shares of 2s. 6d. each. Return dated August 22nd, 1929. 100 "A" and 4,000 "B" shares taken up. £500 paid. £100 calls unpaid. Mortgages and charges, nil.

**Ozonair, Ltd.**—Capital, £40,000 in 2s. shares. Return dated May 27th (filed October 23rd), 1929. 80,520 shares taken up. £4,252 paid. £3,800 considered as paid. Mortgages and charges: £8,000.

**Para Electric Railways & Lighting Co., Ltd.**—Capital, £780,000 in 390,000 preference and 390,000 ordinary shares of £1 each. Return dated May 6th (filed September 26th), 1929. 325,000 preference and 390,000 ordinary shares taken up. £25,040 paid on 25,000 preference and 40 ordinary shares. £639,960 considered as paid on 300,000 preference and 389,960 ordinary shares. Mortgages and charges: £514,722.

**Christy Brothers & Co., Ltd.**—Capital, £65,000 in 47,000 ordinary, 3,000 deferred, and 15,000 preference shares of £1 each. Return dated August 13th, 1929. 44,399 ordinary, 3,000 deferred, and 5,485 preference shares taken up. £43,059 paid. £9,800 considered as paid. £25 calls unpaid. Mortgages and charges: £5,850.

**F. W. Lamp Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated December 31st, 1928 (filed August 29th, 1929). Two shares taken up. £2 paid. Mortgages and charges: £500.

**Vio-Ray Electric Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated December 31st, 1928 (filed August 20th, 1929). 377 shares taken up. £377 paid. Mortgages and charges, nil.

**Chislehurst Electric Supply Co., Ltd.**—Capital, £15,000 in £5 shares. Return dated October 29th, 1929. All shares taken up. £15,000 paid. Mortgages and charges, nil.

**Bestolamps, Ltd.**—Capital, £3,000 in 2,500 preference shares of £1 each and 10,000 ordinary shares of 1s. each. Return dated December 31st, 1928 (filed October 4th, 1929). 1,300 preference and 10,000 ordinary shares taken up. £1,225 paid on 750 preference and 9,500 ordinary shares. £575 considered as paid on 550 preference and 500 ordinary shares. Mortgages and charges, nil.

**Neron Lamps, Ltd.**—Capital, £5,000 in £1 shares. Return dated July 3rd, 1929. All shares taken up. £5,000 paid. Mortgages and charges, nil.

**Bowyer-Lowe Co., Ltd.**—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated December 3rd, 1929, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

**"M. P. A." Wireless, Ltd.**—Issue on November 28th, 1929, of £3,600 debentures, part of a series already registered.

# City Notes.

### British Vacuum Cleaner and Engineering Co., Ltd.

The annual meeting of this company was held on December 23rd, Mr. H. C. Booth (chairman) presiding. In presenting the report and accounts, the chairman said that there had been a further increase in the company's turnover which had been achieved in the face of increasingly severe competition and in spite of restricted trading conditions in this country. Such conditions had only been overcome by the most insistent sales effort and somewhat increased selling costs, particularly in the domestic machine section, the turnover of which was a very substantial proportion of the whole. One of the encouraging features of the business at the present time was the growth of the heavy plant section, which catered for the installation of large-capacity dust extraction plant in large buildings, and in the installation of boiler flue-dust and ash-removal plant for big generating stations and industrial power houses. Although the company was to-day in a stronger position than for many years past, and showed continuous development, there were still difficulties ahead, but they were prepared to meet them with confidence. The report and accounts were adopted.

### Ceara Tramway, Light and Power Co., Ltd.

Presiding at the annual meeting of this company, Mr. E. H. R. Trenow (chairman) said that the year ended June 30th last established a record in net receipts in currency—and this in spite of the fact that the tramway traffic had been adversely affected by motor-omnibus competition. To meet this competition the company had acquired and had put into operation 14 motor-omnibuses, which were running as a counter to those opposing the tramways. Though the tramway receipts had suffered from the cause mentioned, the falling off had been more than offset by economies in operation, and by the increase in earnings of the power supply section of the company. This last source of revenue was the most encouraging part of the business, although the margin of profit at which power was supplied was very narrow. The company had decided to install a complete new turbo-generator to meet the increasing demand for power, and it was hoped to be able to add this unit to the assets without making an addition to the capital. Regarding the scheme for setting aside a sum for division among certain members of the Ceara staff by way of a bonus, they had given effect to that idea in the present accounts, and had made provision by way of a percentage calculated upon the dividend actually to be distributed among the shareholders. The report and accounts were adopted.

### British Radiostat Corporation, Ltd.

This company, which is incorporated under the Canadian laws, has published particulars of its constitution and objects in compliance with Stock Exchange regulations. It has an authorised capital of 1,000,000 shares of no par value, of which 953,000 have been issued. The company was formed on October 24th last with the objects of acquiring from Mr. James Robinson, D.Sc., Lt.-Col. Adrian Simpson, C.M.G., Mr. Peter Garton and the Rt. Hon. F. E. Guest, P.C., "the existing plant and machinery, rights and patents of 'Stenode Radiostat' inventions and all improvements therein; patents of other inventions, future patents and processes in connection with the foregoing, and generally of carrying on the business of wireless, electrical, cable, communication and allied concerns." The directors are Mr. Lawrence Macfarlane, K.C. (Montreal), chairman, the Rt. Hon. F. E. Guest, Mr. W. D. Deans, Mr. Peter Garton, Mr. A. Kirby, the Hon. Adrian Knatchbull-Hugessen, and Lt.-Col. Adrian Simpson. One of the contracts entered into refers to the sale of the shares at $10 each.

### Tata Hydro-Electric Supply Co.

The report for the year ended June 30th last records a net profit of Rs. 16,41,203. A dividend on the ordinary shares of 7 per cent. is declared, Rs. 1,012 is written off brokerage on debentures and loss on investments, Rs. 1,35,000 is appropriated for depreciation on investments and Rs. 1,55,192 is carried forward. The electrical energy sold totalled 102,000,000 kWh, as against 114,000,000 kWh in the preceding year. Reference is made in the report to the interest acquired by the American and Foreign Power Co., Inc., in the Tata Power Group.

### Andhra Valley Power Supply Co.

The net profit for the year ended June 30th last was Rs. 7,36,183. After providing for depreciation on investments (Rs. 1,35,000), writing off loss on investments sold (Rs. 7,777), payment of preference dividend, and a dividend of 2 per cent., free of tax, on the ordinary shares, Rs. 29,188 is carried forward. The electricity sold decreased from 118,000,000 to 114,000,000 kWh. Reductions have been made in the rates to cotton mills.

### Perak River Hydro-Electric Power Co., Ltd.

The report for the year ended July 31st last shows that the costs of operation of the steam station for about seven months, less revenue from sales of energy and interest on investments, was £321,382. This has been debited to capital expenditure making a total of £3,200,155. It is reported that good progress is being made with the hydro-electric works, and it is hoped that the final section of the dam will be completed early this year. The formal annual meeting was to be held on December 31st, but it was to be adjourned to a later date.

### West India and Panama Telegraph Co., Ltd.

A meeting has been called for January 20th, to consider the revision of the articles of association to secure the maintenance of British control. It is proposed that only British subjects shall be eligible to sit on the board, with the proviso that this shall not apply to directors of Cables & Wireless, Ltd. Also it is suggested that foreign holdings of the company's capital shall be restricted to 25 per cent of any class of shares.

### Pye Radio, Ltd.

This company was formed in February last year to take over the business of W. G. Pye & Co., Cambridge. In a circular recently sent to the shareholders, the directors state that the sales during the eight months ended with November last were more than double those of the corresponding period of 1928. Large extensions are being made to buildings and plant.

### John Shaw & Sons, Wolverhampton, Ltd.

The net profit for the past year was £5,833, as compared with £11,576 in the preceding year. A balance of £34,268 brought forward is added, making £40,101. The preference dividend is paid and £31,553 is carried forward. Last year the ordinary shares received 3 per cent.

### W. & T. Avery, Ltd.

The interim dividend on the ordinary shares is maintained at 5 per cent.

# Stocks and Shares.

NEW YEAR'S EVE, 1929.

THE seasonable wishes for a Prosperous New Year with which it seemed rational enough to conclude our Stock Exchange survey made twelve months ago, have been doomed to disappointment. Investment had enjoyed two years of advancing prices and good business, for the industrial boomlet of 1928 followed upon a period of activity and strength in 1927. But the year 1929 began under the shadow of grave fears regarding the health of His Majesty the King. Upon the happy removal of this anxiety, a new cause for uneasiness appeared, in the shape of a General Election. Impartiality is bound to admit that the advent of a Labour Government is not an immediate bull point for Stock Exchange securities.

### Effect of American Speculation.

Meanwhile, a gigantic snowball of gambling in America began to affect the money markets, owing to the American demand for capital and for credit. The Bank of England Rate rose, by stages, from 4½ per cent. to 6½ per cent., reverting to 5 per cent. upon the bursting, in the United States, of the bullish bubble, with consequent devastation and ruin amongst many of the smaller American operators. Canada, Belgium, and France became influenced, to a wider or narrower degree, by the American slump. Prices came down as rapidly as rocket-sticks after the fireworks have "gone off," and the year finishes in a depressed condition as regards stock and share values. The financial troubles abroad are accompanied and accentuated by the results of what is called the Hatry collapse, and of several other melancholy happenings that have cost the public a great deal of money.

### Foreign Control.

One of the many unusual incidents marking the year 1929 has been a keen desire on the part of Americans to obtain controlling interests in various British companies. Over the General Electric Co., Ltd., no little excitement arose, attention focusing upon a new issue of shares that was to have been made. Representatives of American shareholders in the G.E.C. rushed across the Atlantic, and, for a week or so, the situation seemed very tense. The new issue was withdrawn, however, at the eleventh hour, and tranquillity became restored. Other companies have taken steps, during 1929, to prevent control from passing out of British hands. Cool, if slightly cynical, observers said it was rather a pity not to let the Americans pay the high prices which they appeared willing to give, seeing that they, the would-be purchasers, were likely to become eager sellers when the inflation subsided, and when the British holders might be able to repurchase at a handsome profit. However, the majority of British companies which altered their articles, or otherwise contrived to exclude the possibility of foreign control, had no difficulty in obtaining their shareholders' consent to the proposals.

### Electricity Supply Shares.

Save in a few exceptional cases, the list of share-prices in the London electricity supply group has been more affected by money market considerations than by other factors. The result is seen in what may be described as a somewhat colourless catalogue of alterations. County of London and Metropolitan Electrics are the two chief exceptions. The prices of both have moved in volatile fashion. Following upon substantial rises in 1928, further advances were made upon buying hinted to be transatlantic in origin. That this must have been the case was an inference strengthened by the fact that the shares were freely sold at the time of the American collapse in October and November. Both the companies have made new issues of ordinary shares, the County of London asking 36s., and the Metropolitan 30s. per share, thus conferring rights upon the allottees. The Folkestone Electric has been bought by the County of London. In Northampton Electric shares a lively rise occurred on demand said to emanate from the Greater London and Counties Trust. This Trust is a company with close American associations; Lord Birkenhead is now chairman, Sir Austen Chamberlain and Sir L. Worthington-Evans being amongst his co-directors on the board.

The changes which have occurred are indicated in this table. The prices of December, 1927, are added for purposes of comparison :—

ELECTRICITY SUPPLY SHARES.

| Ordinary. | December. 1927. | 1928. | Now. | Rise or fall. |
|---|---|---|---|---|
| Brompton ... ... ... | 24/6 | 27/0 | 25/6 | −1/6 |
| Charing Cross ... ... | 26/0 | 26/6 | 26/0 | −6d. |
| Chelsea ... ... ... | 25/6 | 27/0 | 25/0 | −2/0 |
| City of London ... ... | 30/0 | 30/9 | 32/0 | +1/3 |
| County ... ... ... | 28/6 | 44/6 | 42/6 | −2/0 |
| Kensington ... ... | 25/6 | 26/6 | 26/0 | −6d. |
| London ... ... ... | 25/0 | 26/0 | 26/0 | — |
| Metropolitan ... ... | 30/0 | 46/3 | 37/6 | −8/9 |
| St. James' ... ... ... | 26/0 | 27/6 | 26/0 | −1/6 |
| South London ... ... | 25/6 | 27/6 | 25/6 | −2/0 |
| Westminster ... ... | 25/6 | 27/0 | 25/0 | −2/0 |

### Home Railway Stocks.

The Home Railway companies have made a distinct step, during the year under review, in the direction of effectively meeting road competition, and of regaining part of their lost traffic. But this is a matter that scarcely affects the electric and tube railway stocks, and the Underground Electric Railways of London issues have gone back upon the Government's announced intention of taking some kind of hand in the business of London's transport. Nobody yet knows what is going to happen, but how the uncertainty has depressed prices is shown in this catalogue of declines :—

RAILWAY STOCKS AND SHARES.

| Stock or share. | December. 1927. | 1928. | Now. | Fall. |
|---|---|---|---|---|
| Central London ord. ... | 71 | 73 | 71 | 2 |
| Metropolitan ... ... | 70 | 65 | 62½ | 2½ |
| District ... ... ... | 66 | 80¼ | 72 | 8¼ |
| Underground Shares ... | 19/6 | 26/6 | 21/6 | 5/0 |
| Underground Income ... | 105 | 126 | 104 | 22 |

### Cables and Wireless.

This time last year, Eastern Telegraph ordinary stock stood at 267½. Eastern Extensions and Western Telegraphs were both 26¾. The price of the stock rose, this year, to 280; the shares went to 28. Now, under the guise of Cables and Wireless preference, "A" ordinary and "B" stocks, the older quotations have undergone material shrinkage. For this the various reasons have been dealt with here from time to time, when reference has also been made to the fact that the "B" stock, now quoted about 35, stood 67 points higher early in July, within a week of the new stocks being dealt in, for the first time, in the London Stock Exchange. It had been assumed in advance that the Americans, who were then buying anything and everything, would eagerly seize upon this particular issue as carrying the chief speculative, and therefore unknown, property of attraction; and doubtless the American brigade laid in a certain amount of supply. The buyers were, however, quickly satisfied, and the stock has fallen in price with no more than a very occasional reaction. The rise in Indo-Europeans is due to the offer of £55 made to the proprietors for their shares. The Anglo-American group has maintained an attitude of steadiness throughout the year. There has been a fair amount doing in the shares of the various foreign telephone companies. Canadian Marconis, which touched at one time last year £6 a share, are now back to 17s. 6d. Some of the principal variations are as follows :—

CABLE STOCKS AND MARCONIS.

| Stock or share. | December. 1927. | 1928. | Now. | Rise or fall. |
|---|---|---|---|---|
| Anglo-American pref. ... | 93¼ | 103½ | 101½ | −2 |
| Eastern Extension ... ... | 15 | 26¾ | 24¾ | −1¾ |
| Eastern Telegraph ... ... | 145 | 267½ | 249 | −18½ |
| Globe ordinary ... ... | 14¾ | 25½ | 23 | −2½ |
| Great Northern ... ... | 38¼ | 34½ | 29¾ | −4¾ |
| Indo-European ... ... | 40 | 47½ | 52¼ | +5 |
| Marconi ... ... ... | 37/6 | 78/9 | 56/9 | −22/0 |
| Western Telegraph ... ... | 14 | 26¾ | 24¾ | −1¾ |

With regard to the Eastern Telegraph group and Marconi shares, to-day's equivalents in the prices of the Cables and Wireless issues have been taken, for the purpose of comparison, at 96½ for the preference, and 74 and 35 for the "A" and "B" ordinary stocks, respectively.

### Dollar Stocks.

It is in the group of stocks and shares connected with the utility companies of the United States, Canada and Mexico that the principal price-changes of the year are to be found. Extraordinary fluctuations have occurred. The American public went Stock Exchange mad in the early autumn of 1929. Prices were no longer to be judged, according to the bullish arguments, by the dividends that the stocks received, but by the earning-capacity of the companies. On this line of contention, it was deemed not imprudent to buy utility shares, the current dividends on which allowed for no more than 1 or 2 per cent. interest on the purchaser's money. Prophecy looked far into the future, and projected its cheerfulness over half a decade. The frenzy flamed too furiously for it to last, and deflation started in September. On two particular occasions there were disastrous slumps, the results of semi-panic, and, although prices have recovered considerably from the lowest levels to which they then fell, the aftermath of the fall is still felt. Gathering up the net consequences of the year in the cases of some of the familiar dollar stocks, the following table affords interesting comparisons. There is no particular use in adding the prices of December, 1927, for, in those days, the circle of British interest in the majority of these particular American stocks was extremely circumscribed.

| Shares. | 1929. Jan. 2. | Dec. 31. | Rise or fall. |
|---|---|---|---|
| Brazilian Tractions ... ... | 78½ | 38 | −40½ |
| Calgary Power ... ... ... | 160 | 160 | — |
| Canadian General Electric ... | 132 | 275 | +143 |
| Mexican Light & Power ... ... | 77½ | 75 | −2½ |
| Mexico Tramways ... ... ... | 47½ | 30 | −17½ |
| Montreal Light & Power ... ... | 111 | 127½ | +16½ |
| Shawinigan ... ... ... ... | 90 | 77½ | −12½ |

### The "Star" Turn.

British Electric Traction deferred ordinary stock started the year at 615, rose at one time to 1,750, and now stands at 1,525, making a rise of 910 points on the year. Beside this, the movements even in American utilities pale their ineffectual fires. The Home Railway companies have been buying up local services of omnibus and other traction undertakings in some of which the controlling interest was held by the British Electric Traction Company. Stocks and shares amongst home electric tramway and similar undertakings have attracted little notice during the year, an extremely occasional spurt of activity in the London shares being the only variation from a long level of neglect.

### Shares in Manufacturing Companies.

Prices of shares in manufacturing companies make a somewhat mixed showing. In spite of the heaviness and depression that have overtaken stocks and shares connected with industrials, especially of recent weeks, the cable manufacturing issues have held their ground with noticeable firmness. For this the reason is, of course, that electricity supply development is being vigorously pushed by the Electricity Commissioners, and the outlook for the trade as a whole is considered to be more promising than that which offers to many other branches of industry. Public imagination has been captured by the activity shown in electrical development, with the result that money has gone steadily into the shares of the companies engaged upon this work. On the other hand, the group has not escaped scot free, and the movements in the list are by no means confined to rises. The New Year is expected to witness further expansion in electrical work of all kinds. Notwithstanding the handicaps imposed upon home and foreign financial enterprise by political and other considerations, it is natural to expect that those who are interested in the stocks and shares of electricity supply and manufacturing companies are likely to enjoy good times in the New Year. A representative half-dozen companies are included in this final list of prices:—

| | December. 1927. | 1928. | Now. | Rise or fall. |
|---|---|---|---|---|
| Babcock ... ... ... | 3½ | 3½ | 60/9 | +9/3 |
| British Aluminium ... | 45/6 | 2¼ | 46/0 | +1/0 |
| Callender's ... ... | 3 15/16 | 4 1/16 | 35/8 | −8/9 |
| G.E.C. ... ... ... | 33/6 | 43/9 | 46/3 | +2/6 |
| Henley's ... ... ... | 5½ | 5¾ | 5 15/16 | +3/9 |
| India-Rubber ... ... | 13/9 | 11/3 | 11/3 | — |

The rubber share market spent the greater part of the year in an atmosphere of complete inanition, owing to the absence of any sustained resiliency in the price of the raw product. Prices are substantially down on balance. Nor did the twelve-month display any particular friendliness to iron, coal and steel shares; the "heavy" industries have lived up too slavishly to the adjective, for the shares in their companies to attract popular attention. A measure of hope lies in the reflection that many prices round the Stock Exchange markets have descended to levels that will offer obvious temptation to purchasers as soon as confidence gets on its legs once more, and the shocks of 1929 become matters of history.

## Share List of Electrical Companies.

#### HOME ELECTRICITY COMPANIES.

| | Nom. £ | Approx. Dividend. 1927. | 1928. | Price Dec. 31 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole ... ... | 1 | 15 | 15 | 57/6 | — | 5 4 4 |
| Brompton Ordinary ... ... ... | 1 | 8½ | 8½ | 25/6 | — | 5 9 10 |
| Charing Cross Ordinary ... ... | 1 | 8½ | 8½ | 26/- | −6d. | 5 7 8 |
| do. do. 4½% Pref. ... | 1 | 4½ | 4½ | 17/- | — | 5 6 0 |
| Chelsea ... ... ... ... ... | 1 | 8¼ | 8¼ | 25/- | — | 5 12 0 |
| City of London ... ... ... | 1 | 10 | 10 | 99/- | — | 4 7 6 |
| do. do. 6% Pref.... | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| Clyde Valley ... ... ... ... | 1 | 8 | 8 | 1½ | −¼ | ... ... |
| County of London ... ... ... | 1 | 7 | 10 | 42/6 | +6d. | 4 14 0 |
| do. do. 6% Pref.... | 1 | 6 | 6 | 22/-xd | — | 5 9 8 |
| Edmundson's 7% Pref. ... ... | 1 | 7 | 7 | 24/- | — | 5 16 8 |
| Elec. Supply Corporation ... ... | 1 | 11 | 11 | 48/3 | — | 4 11 3 |
| Kensington Ordinary ... ... | 1 | 8 | 8 | 26/- | — | 5 7 8 |
| Lancs. Light and Power ... ... | 1 | 7½ | 7½ | 27/- | — | 5 11 2 |
| London Electric ... ... ... | 1 | 8½ | 9 | 28/- | −6d. | 5 7 8 |
| Metropolitan ... ... ... ... | 1 | 9 | 9 | 37/6 | — | 4 16 0 |
| do. 4½% Pref. ... ... | 1 | 4½ | 4½ | 17/-xd | — | 5 6 0 |
| Midland Counties ... ... ... | 1 | 6¼ | 6¼ | 27/- | −6d. | 4 16 4 |
| Mid. Elec. Power ... ... ... | 1 | 15 | 8 | 33/9 | — | 4 14 10 |
| Newcastle-on-Tyne Ordinary ... | 1 | 6 | 6 | 23/9 | — | 5 1 1 |
| do. 7% Pref. ... ... | 1 | 7 | 7 | 25/- | — | 5 12 0 |
| Notting Hill 6% Pref. ... ... | 10 | 6 | 6 | 10-/16 | — | 5 11 7 |
| North Met. Elec. 6% Pref. ... ... | 1 | 6 | 6 | 22/- | — | 5 9 1 |
| St. James' and Pall Mall ... ... | 1 | 8 | 8 | 26/- | — | 5 7 8 |
| Scottish Power ... ... ... | 1 | 8 | 8 | 29/- | — | 5 19 8 |
| South London ... ... ... ... | 1 | 8½ | 8½ | 25/6 | — | 5 9 10 |
| Urban Ordinary ... ... ... ... | 1 | 7 | 7 | 33/9 | −1/16 | 4 3 0 |
| Victoria Falls Ord. ... ... ... | 1 | 15 | 15 | 2¾ | — | 5 4 2 |
| Westminster Ordinary ... ... | 1 | 8½ | 8½ | 25/- | — | 5 19 0 |
| Whitehall Elec. Invst. 7½% Pref. ... | 1 | 7½ | 7½ | 23/6 | — | 6 7 8 |
| Yorkshire Elec. ... ... ... | 1 | 8 | 8 | 32/- | −1/9 | 5 0 0 |

#### HOME RAILS.

| | | Nom. £ | Approx. Dividend. 1927. | 1928. | Price Dec. 31 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|---|
| Central London Ord. Assented ... | Stock | 4 | 4 | 71 | — | 5 12 8 |
| Metropolitan ... ... ... | ,, | 8 | 8½ | 69½ | — | 12 0 |
| do. District ... ... | ,, | 4 | 5 | 72 | — | 6 19 0 |
| Underground Electric ... ... | £1 | 5 | 7 | 31/6 | — | 6 10 3 |
| do. do. Income ... | Bonds | 6 | 6 | 104 | +1 | 5 15 6 |

#### TELEGRAPHS AND TELEPHONES.

| | | Nom. £ | Approx. Dividend. 1927. | 1928. | Price Dec. 31 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. ... ... | Stock | 6 | 6 | 101½ | — | 5 18 8 |
| do. Def. ... ... ... | ,, | 1½ | 1½ | 94½ | — | 6 4 5 |
| Automatic Telephone ... ... | 1 | 10 | 12½ | 57/6 | — | 6 13 4 |
| Cables & Wireless 5½ Pref. ... ... | Stock | — | — | 96½ | +½ | 5 14 0 |
| do. A 7½ Ord. ... ... | ,, | — | — | 74 | −2½ | ... ... |
| do. B Ord. ... ... | ,, | — | — | 35 | −2½ | ... ... |
| Globe Tel. and T. Ord. ... ... | 10 | 10 | 10 | 23xd | +½ | *4 7 0 |
| do. do. Pref. ... ... | 10 | 6 | 6 | 10½xd | — | 5 9 1 |
| Great Northern Tel. ... ... | 10 | 20 | 20 | 29½ | −½ | 6 14 5 |
| Indo-European ... ... ... | 25 | 10 | 10 | 52½ | — | *3 16 2 |
| Marconi-Marine ... ... ... | 1 | 12½ | 15 | 2¾ | −1/16 | ... ... |
| Oriental Telephone Ord ... ... | 1 | 12 | 12 | 9½ | — | *4 5 5 |

#### HOME AND FOREIGN TRAMS, &c.

| | | Nom. £ | Approx. Dividend. 1927. | 1928. | Price Dec. 31 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. ... | 5 | 5½ | 5½ | 8xd | — | 9 8 4 |
| do. do. 2nd Pref. ... | 5 | 6 | 6 | 3xd | — | 10 0 0 |
| do. do. 5% Deb. ... | Stock | 5 | 5 | 71½ | −1 | 6 19 10 |
| British Electric Traction Def. Ord. | ,, | 5 | 5 | 1525 | — | ... ... |
| do. do. Pref. Ord. | ,, | 8 | 8 | 121½ | +1½ | 6 11 9 |
| Brazil Traction ... ... ... | 100 | 7 | 8 | 38 | −3½ | 5 5 8 |
| Brit. Columbia Elec. Rly. Pcs. ... | Stock | 5 | 5 | 88½ | +1 | 5 18 0 |
| London & Sub. Trac. 5% Pref. ... | 1 | Nil | Nil | 10/- | — | ... ... |
| London United Tram Deb. ... | Stock | 4 | 4 | 50½xd | — | 7 18 0 |
| Mexico Trams, 5% Bonds ... ... | — | 5 | 5 | 66½ | −8 | 7 10 5 |
| Mexican Light Common ... ... | 100 | Nil | Nil | 75 | — | ... . |
| do. 7% Pref. ... ... | 100 | 7 | 7 | 74½ | −8 | 9 8 0 |
| do. 1st Bonds ... ... | — | 5 | 5 | 74½ | +1 | 6 14 8 |
| Yorkshire (West Riding) ... ... | | Nil | Nil | 5/- | — | ... ... |

#### MANUFACTURING COMPANIES.

| | Nom. £ | Approx. Dividend. 1927. | 1928. | Price Dec. 31 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. ... ... ... | 1 | 6 | — | 25/9 | — | 4 13 2 |
| Babcock & Wilcox ... ... ... | 1 | 18 | 15 | 60/9 | −6d. | *4 18 8 |
| British Aluminium Ord. ... ... | 1 | 10 | 10 | 46/- | — | *4 7 0 |
| British Elec. Transformer Pref. ... | 1 | 7 | 7 | 18/- | — | ... ... |
| British Insulated Ord. ... ... | 1 | 15 | 15 | 3½ | +1/16 | 5 18 9 |
| Brush Ord. ... ... ... ... | Stock | 10 | 10 | 136½ | — | 7 18 1 |
| Callenders ... ... ... ... | 1 | 15 | 15 | 3½ | −⅛ | 4 2 8 |
| do. 6½% Pref. ... ... | 1 | 6½ | 6½ | 1½ | — | 5 4 0 |
| Crompton Parkinson Ord. ... ... | 5/- | — | 30 | 30/- | — | 7 10 0 |
| do. 8% Pref. ... ... | 1 | 8 | 8 | 25/- | — | 6 8 0 |
| Edison-Swan 1st Pref. ... ... | 1 | 7½ | 7½ | 24/6 | — | 7 1 2 |
| do. 5% Deb. ... ... | Stock | 5 | 5 | 69½xd | — | 6 1 3 |
| Electric Construction ... ... | 1 | 7½ | 5½ | 15/- | — | 7 6 8 |
| Enfield Cable Ord. ... ... ... | 1 | 20 | 20 | 4⅝ | — | 4 2 0 |
| English Electric ... ... ... | 1 | Nil | Nil | 3/9 | −1/16 | ... ... |
| do. do. Pref. ... ... | 1 | 8 | Nil | 7/6 | — | ... ... |
| Gen. Elec. Pref. ... ... ... | 1 | 6½ | 6½ | 24/- | — | 5 8 4 |
| do. Ord. ... ... ... | 1 | 10 | 10 | 3-/16 | −1/16 | 4 6 7 |
| Henley ... ... ... ... | 1 | 25 | 30 | 5½ | — | 5 1 0 |
| do. 4½% Pref. ... ... ... | 5 | 4½ | 4½ | 42 | — | 5 6 0 |
| India-Rubber ... ... ... ... | 1 | Nil | Nil | 11/3 | — | ... ... |
| Johnson & Phillips ... ... ... | 1 | 10 | — | 36/3 | — | 6 10 3 |
| Siemens Ord. ... ... ... ... | 1 | 7½ | 7½ | 25/- | −1/16 | 6 0 0 |
| Telegraph Construction ... ... | 12 | 10 | 10 | 23 | — | *5 4 2 |

* Dividends paid free of Income Tax.

# Electricity Commissioners' Inquiries.

## Supply in South Devon; the Transfer of the Hereford Undertaking; and the North-East Coast Companies' Charges.

### South Devon.

AN inquiry was held recently at Torquay by Col. T. C. Ekin, M.Inst.C.E., Chief Engineering Inspector to the Electricity Commissioners, into applications by the Torquay Corporation, and Mr. W. G. Heath, of Plymouth, for Special Orders to authorise them to supply electricity in an extensive area of South Devon.

Submitting the case for Mr. Heath, Mr. F. G. Thomas, K.C., said that of the three local authorities concerned in the matter, Mr. Heath had the consent of two—Ivybridge Urban District Council and Kingsbridge Rural District Council—Totnes dissented. It was intended, if the Order was granted, that Mr. Heath's interests should be acquired by the Whitehall Securities Corporation, which had taken substantial interest in the promotion of electricity supplies, and in Devon and West Somerset had spent £750,000 on electricity undertakings. Water power at South Brent and Ivybridge was regarded as an important asset in connection with Mr. Heath's proposals, but he admitted that it would be essential to rely on Plymouth or Torquay for a bulk supply for a considerable part of the area, although neither authority had been approached on the subject. The capital expenditure it was proposed to make in the early year would be £65,000, which sum the Whitehall Securities Corporation was prepared to put down. The charges would be the same as those adopted for other undertakings controlled by the promotors.

Presenting the case for the Torquay Corporation, Mr. W. Craig Henderson said that already the Corporation served a number of parishes in the Totnes area, and the Order, if granted, would enable it to supply 10 others. The question of bulk supplies in the additional area asked for, had a very important bearing on the matter. Mr. W. M. Selvey, the Corporation's consulting engineer, came to the conclusion that the scheme for the inclusion of the Totnes parishes alone was not a good one. Dartmouth wanted a bulk supply, and the question of bulk supplies to Kingsbridge and Salcombe arose. It was learned that each of these towns desired bulk supplies, and terms had been practically arranged with them as well as Dartmouth. Totnes was in the position that a bulk supply would become imperative to meet the needs of the district, and that supply could only come from Torquay Corporation, which proposed to take a main through Totnes and into Dartmouth, passing through some villages. The mains which the Corporation proposed to lay would reach 80 per cent. of the population of the whole district.

Mr. Selvey, in supporting the Corporation's application, said that its power station at Newton Abbot had been increased to 24,000 kW, and the central undertaking was well capable of serving the proposed new area, which was compact and easy to deal with.

The Commissioners will issue their decision in due course.

### Proposed Transfer of Hereford Undertaking.

On Friday, December 20th, Col. Ekin conducted a public inquiry at Hereford into the proposed transfer by the Hereford City Council of its electricity undertaking to the Shropshire, Worcestershire and Staffordshire Electric Power Company.

The case for the Corporation was conducted by Mr. S. G. Turner, and Mr. E. S. Herbert appeared for the company. Alderman E. L. Wallis led the opposition.

Opening the case for the Corporation, Mr. Turner said that the result of the working of the whole undertaking for the 15 years ended March 31st, 1929, was a total loss of £30,609. For the city area the total surplus amounted to £35,348, but for the rural service during the nine years during which it had operated there was a deficiency of £53,363. If that sum were added to the total of the deficiencies on the city undertaking—£12,593—there was a total deficiency of £65,957, to be set against the surplus on the city undertaking of £35,348, making a net loss on the whole undertaking of £30,609. Of this £24,670 had been met from the rates, leaving a debit balance of £5,988.

Apart from this loss, the operations of the rural undertaking had not resulted in any very substantial developments of the area, on which the amount of the capital expenditure up to March 31st, 1929 was £11,837.

The Corporation had to have regard to the interests of the ratepayers, the consumers in the city, and prospective consumers, and the prospects of reasonable developments in the rural area. In his report, the engineer, Mr. G. D. Coe, pointed out that the generating station was in a reasonably satisfactory condition, but the underground mains in the city required relaying and the condition of the overhead lines in the rural area was bad, and that if the undertaking was to be put into satisfactory condition, a very large immediate capital expenditure was necessary. Three courses were open to the Council:—(1) To continue to run the undertaking on the same lines as before, looking to the ratepayers to make good any deficiencies; (2) to improve the undertaking by making good any deficiencies by immediate capital expenditure, which Mr. Coe estimated at £60,000; and (3) to dispose of the undertaking to some company who might be in a more favourable position to develop it.

Mr. Turner went on to refer to the question of prices to be charged by the company for electricity. He pointed out that the consumer could not be charged more, unless the company could show that there had been an increase in the cost to them of generating and distributing electricity. A further safeguard was that the price was always to be in comparison with the charges in Kidderminster, a more highly industrialised area than Hereford from an electrical point of view, and one in which comparatively low charges could be made.

The first witness called was Mr. J. H. Rider, who had reported on the position of the undertaking and advised the proposed transfer as necessary and beneficial. There was no prospect, he said, of the Corporation being able to carry on the rural supply without serious loss, which he considered should never have been taken on by the Corporation. The Corporation would have the right to purchase the undertaking in 42 years, under certain conditions. The rural area was of no value to the city, and the company could deal with it to much better advantage. If the Corporation were to give away the rural undertaking for nothing, it would be doing a goo dstroke of business, but nobody would take over the rural scheme alone, and so the best course would be to transfer the rural and the city undertaking as a whole.

Mr. J. T. Hyde Legge, managing director, Shropshire, Worcester, & Staffordshire Power Co., said most of the company's equipment was modern, and they had given more attention to the supply of rural areas, he thought, than any other company in the country. The Hereford station would be run in conjunction with the Stourbridge station. The scheme would entail nearly £80,000 expenditure in the rural area. It was the intention of the company that the employés of the present undertaking should be taken over *en bloc*, and they would be treated on similar terms to the company's present employés.

Mr. E. F. Bulmer (chairman of the Electricity Committee of the Corporation) gave reasons why the committee had come to the conclusion that the transfer was the best course in view of the annual losses that were being incurred. The Council would not have consented to a further expenditure of £60,000. An increase of prices would fall on the small consumers, because if the charges paid by firms were increased, they would have provided their own electricity.

Mr. W. Pigott (Hereford Trades and Labour Council) urged that the Committee could have borrowed money to carry on the undertaking instead of selling it, and it could be made to pay. Hereford electricity might one day be needed for factories, and for the electrification of railways, and its use could be encouraged by the sale, by gradual payments, of domestic electrical appliances.

Mr. Jones Newton alleged that the company was now controlled by the Greater London Trust, and it would come under American control. There was no protection in the deed of transfer for the employés, whom the company could discharge and take back under lower wages.

Alderman Wallis, former chairman of the Electricity Committee, opposed the proposed transfer. He said that when Mr. Meakin left in 1927, the deficiency on the rural scheme had been reduced from £17,500 to £3,000. Efforts should have been made to secure for the Hereford undertaking a loan such as had been granted to the similar undertaking of Bedford Corporation. Another objection was the folly of the city parting with its undertaking, yet remaining liable to the mortgagees for £189,000.

The Inspector will report in due course as to whether the transfer should be approved or not.

### Electricity Charges on the North-East Coast.

An inquiry into the maximum charge and the methods of charging for electricity on the North-East Coast by the Newcastle-upon-Tyne Electric Supply Co., Ltd., and its asso-

ciated companies was held at Newcastle from December 17th to 20th by Sir Harry Haward and Mr. W. W. Lackie, Electricity Commissioners, at the instance of thirty local authorities, including the city council of Newcastle.

Presenting the case for the local authorities, Mr. Rowand Harker said that there were few companies which supplied an area containing so many different classes of consumers. In 1928 the load factor was no less than 56 per cent. The companies possessed up-to-date and efficient plant, and their generating costs were low, the figure for 1928 being 0.184d. per kWh. Also, they were fortunate in being able to obtain their supplies of coal at a low cost. Remarkable progress had been made by the companies especially during recent years, the electrical energy sold having increased from 232 million kWh in 1913 to 701 million kWh in 1928. The working expenditure had increased from 0.347d. to 0.436d. per kWh during those years, but the figure for 1928 was lower than that for 1927. During the last four years the number of consumers connected was 47,000. The dividend paid on the companies' capital was 5 per cent. in 1926, the year of the strike, and 6 per cent. for 1927 and 1928. Mr. Harker, in concluding, said that it was suggested that the charge for domestic supply should be reduced to 3.269d. per kWh, and it was with that figure in mind that the authorities put forward a proposal of 4½d. per kWh for the maximum charge. Sir George Lunn, chairman of the Parliamentary Committee of the Newcastle City Council, admitted that some consumers were receiving their supplies at considerably less than 3.59d. per kWh, but not those on whose behalf he was speaking, namely, the small consumers. He did not think that an example of charges given by the supply company for a four-roomed house was exorbitant, and added that he considered that a working man with regular employment and moderately steady wages could afford to pay 1s. a week for electricity. It was unfair, however, that a working man in Jarrow should have to pay 6d. or more per kWh while a fellow worker living on the other side of the road who received his supply from South Shields paid 3½d.

Evidence was formally received from representatives of the other local authorities.

Speaking on behalf of the power companies, Mr. Tyldesley Jones submitted that it was absolutely essential that the electricity companies should give cheap supplies for power. He explained that certain readjustments in respect of meter rents discontinued by the company, interest and appropriation to reserves had increased the net figure of 3.269d. per kWh put forward by the local authorities to 3.354d. The supply companies' figure was 3.379d., so that there was, after all, a difference of only 0.025d. Referring to the small consumers, Mr. Jones stated that the householder with three or four rooms, according to the table submitted by the local authorities, was shown to be getting very substantial benefits under the new scale of charges. The new shop-lighting tariff, with one exception, would prove a reduction. If the supply companies, by reason of an order made on this application, were made to reduce their charges to the small consumer, they would have to make up the deficit by raising the price to other consumers.

During an examination by Mr. F. J. Wrottesley, Mr. R. P. Sloan, chairman and managing director of the Newcastle-upon-Tyne Electric Supply Co., Ltd., and chairman of the associated companies, stated that the average selling price per kWh of the Newcastle company was the lowest in the kingdom. Submitting figures indicating the growth of the domestic consumption, he said that at the end of 1928 there were 76,140 domestic consumers, as compared with 22,950 in 1921, and that 30,629 new consumers had been connected during the last three years, the greatest increase coming from the section of consumers who were alleged to be most dissatisfied. Cross-examined by Mr. Harker, Mr. Sloan admitted that his company had the lowest working costs and best load factor in the country, but denied that the charges to domestic consumers were the highest. The company's policy, contended Mr. Harker, did not appear to be likely to encourage the use of electricity by domestic consumers, and unless a substantial reduction in price was made the consumption of electricity by this class of consumer would soon be of an almost infinitesimal character. If a maximum charge of 4½d. per kWh were fixed for the congested areas and a little more for the other areas, he thought substantial justice would be done.

The inquiry was concluded, and the Electricity Commissioners will announce their decision in due course.

# The Electrical Development Association.

**In the following notes Lt.-Col. W. A. Vignoles, the Director of the Association, reviews its activities during the year 1929.**

DURING the past twelve months considerable progress has been made by the E.D.A. in all directions. Some 35 new members have joined the Association, and the reorganisation of the Area Committees in all parts of the country has been successfully completed. Area Committees, fully representative of all sections of the electrical industry, have been formed in the nine provincial areas into which the kingdom is divided, the names of the areas and the towns at which they are centred being as follows:—South West, Bristol; South Wales, Cardiff; South Midland, Birmingham; North-West, Manchester; North Midland, Leeds; North-East, Newcastle-on-Tyne; East of Scotland, Edinburgh; West of Scotland, Glasgow; North of Ireland, Belfast.

Arrangements have been made for all E.D.A. Circles to be represented on the appropriate Area Committees, and as the latter in turn have representation on the E.D.A. Council, ample facilities are available for local and area opinions to receive the fullest consideration. The Area Committees have effectively carried out propaganda work in the form of conferences, lectures and participation in exhibitions, and they form, in addition, a means for co-operation with individuals in places where E.D.A. Circles are now being formed. In each area there is an E.D.A. representative who is anxious to assist and co-operate with all those who are interested in development work.

Among the more important Area Committee activities during the past year may be mentioned the E.D.A. stand at the North-East Coast Exhibition. The E.D.A., through its Area Committees, also took part in the British Industries Fair, Birmingham, and the Smoke Abatement Exhibition, Manchester. Several Sales Conferences similar to those held in London each month have also been arranged in provincial centres, and have attracted large audiences.

The Association has given advice and assistance in connection with the organisation of many local electrical exhibitions all over the country, notably that at Brighton in October. The Factory and Workshop Lighting Campaign, conducted by the E.D.A. last winter, was brought to a successful conclusion by circulating in October, to a carefully prepared list of factory owners, a booklet containing photographs of lighting installations which had been brought up-to-date as a result of the campaign. The National Campaign for 1929-30 is the E.D.A. Electric Homes (Outlet) Campaign, which is designed to secure a larger number of plug points for the convenient use of electricity in houses that are being built, and existing houses. An attractive booklet entitled "The House You Want" has been prepared, and will, it is hoped, be widely distributed. A Home Wiring Specification has also been drawn up, which is designed to assist both the house buyer and the electrical contractor to stipulate a minimum standard number of points to be installed in the various rooms of a house. A number of new posters dealing with various domestic applications of electricity have been produced and increasing use is being made of this effective and economical method of publicity.

A large number of lectures has been given by the Association's official lecturers and others, the more important audiences addressed including the Architectural Association, the Smoke Abatement League, and the Royal Sanitary Institute, while a series of lectures has been given in Leeds, Newcastle, and London, to teachers and students of domestic science. The latter class of audience is keenly alive to the possibilities of electricity in domestic service, and it is hoped that manufacturers and supply undertakings will co-operate by arranging for electrical apparatus to be available for practical use in schools.

Last March the production of a kinema film, entitled "County Currents," showing the use of electricity on the farm and in rural industries, was completed, and it has since been shown with great success to audiences in rural areas, and at agricultural shows. Continuous use has been made of other E.D.A. films. A large number of propaganda booklets dealing with a wide range of applications of electricity, such as refrigeration, industrial heating, electricity on the farm, and in schools, has been produced.

This winter the Association is continuing to circulate each month, to the whole of the electrical industry, booklets describing current advertising material available for local advertisements, and suggestions for effective window displays, the material for which can be obtained at small cost.

# Colliery Electrification.

## Some Particulars of the Recently-installed Equipment at the Emlyn Anthracite Collieries.

CONSIDERABLE extensions have recently been made to the plant and equipment of the Emlyn Anthracite Collieries, in particular by the addition of a most modern type of screening plant. These extensions, coupled with the further development of the workings, necessitated a corresponding increase in the electrical plant from the points of view of generation and motors for driving the new machinery. In consequence, a contract of a most comprehensive character was placed with the General Electric Co., Ltd. This contract provided for main generating plant, a synchronous induction motor-generator set, h.p. and l.p. power-house switchgear, a transformer, industrial oil-immersed draw-out switchgear, motors and motor-control gear, and a considerable quantity of cable.

Before the extensions the power house contained a 200-kW E.C.C.-Belliss d.c. set, installed in 1908, and a 300-kW G.E.C.-Browett Lindley set, installed later. To these have now been added a 600-kW G.E.C.-Browett Lindley d.c. set, 500 volts, 300 r.p.m., a 250-kW reversible synchronous induction motor-generator set, a new truck-type cubicle board, a 400-V, a.c. flat-back board, and extensions were made to the existing 500-volt d.c. board. Further, a 500-kVA, 12,000/440-volt G.E.C. transformer was installed in a sub-station adjoining the power house. Views of the interior of the station are shown in figs. 1 and 5. The colliery was originally supplied with direct current from the older steam generating sets mentioned above. As it was desired to use alternating current for supplying the newer section of the colliery, it was decided to take a supply from the 12,000-volt mains of the Llanelly Electric Light and Traction Co., Ltd. In doing this, the question of ensuring the best possible load factor was carefully considered, and as a result it was found that it could be obtained by the installation of a 250-kW synchronous induction motor-generator set. During the normal working periods the motor-generator set is run to correct the power factor, and only loaded on the d.c. side sufficiently to represent the difference between the alternating current taken direct and the predetermined maximum demand. This d.c. load is supplemented by the existing reciprocating sets to supply No. 1 colliery.

**Fig. 1.—The new G.E.C.-Browett Lindley Set in the Power Station.**

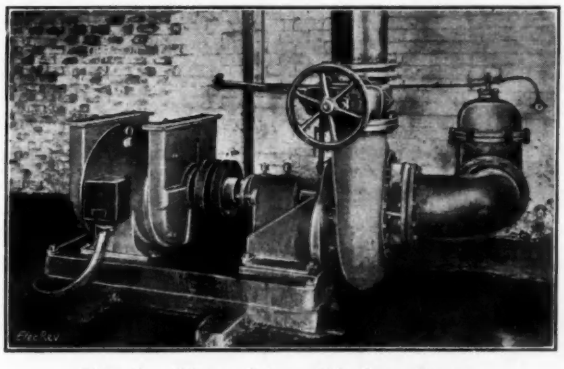


**Fig. 2.—Motor-driven Washery Pump.**

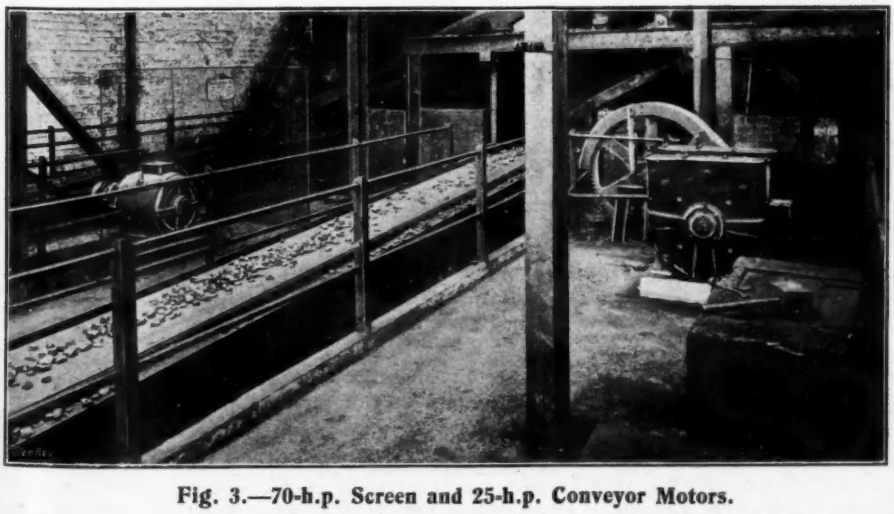


**Fig. 3.—70-h.p. Screen and 25-h.p. Conveyor Motors.**

The power for the screens and washing plant and No. 2 colliery is taken direct from the a.c. supply, except in the case of those machines that are running continuously, namely, the ventilating fans and pumps, which can be driven by either d.c. or a.c. motors. The d.c. motors are used during normal working periods, and the a.c. machines during light periods and week-ends. By such an arrangement it is possible to balance the a.c. load, so that the same kVA is taken constantly over 24 hours, thus producing as nearly as possible 100 per cent. load factor at unity power factor, and hence a minimum cost per unit. At the same time, an emergency a.c. supply is available by running the synchronous motor-generator set inverted, *i.e.*, taking the direct-current supply from the reciprocating sets and generating a.c. current, and thus keeping the main arteries of the colliery working should the power company's supply fail.

The main 12,000-volt in-coming supply from the mains of the Llanelly Electric Light and Traction Co. is brought to the steel-plate cubicle of the h.p. board; duplicate feeders are provided. This cubicle and the adjacent truck cubicle are the supply company's equipment. The former is an isolating-link cubicle with a two-way and off-position rotary link. The latter is equipped with a main oil circuit breaker of 300 A capacity, with overload and leakage trips, together with appropriate instruments.

It is of great importance that any fault in a colliery electrical system should be detected at the earliest possible moment. To this end special leakage indication apparatus is connected in an earth circuit to the neutral point of the 440-volt side of the transformer. This apparatus consists of an ammeter, with 0-5 A scale, and an automatic short-circuiting switch, which cuts the ammeter out should the earth current exceed its safe loading. An alarm circuit is also provided, so that immediate attention is attracted should the fault current reach a predetermined value.

As already indicated, there is a large number of "Witton" motors driving the various items of colliery equipment, including one of 110 h.p. running at 970 r.p.m., driving a Waddell main ventilating fan; four of 70 h.p., and four of 25 h.p. All these are three-phase machines of the high-torque squirrel-cage pattern, and are designed for 50-cycle, 440-volt circuits.

The four 70-h.p. motors, which are of the pipe-ventilated type, run at 715 r.p.m and drive apparatus as follows: (*a*) classifying and dust-extraction screens through line shafting, the motor drive being by means of a geared raw-hide pinion and a centrifugal coupling clutch—this motor is shown at the right of fig. 3; (*b*) main screens through belt drive to line shafting, fig. 4, right; (*c*) bucket elevators and main feed elevator, through belt drive to line shafting; (*d*) a main centrifugal pump which supplies the washery, fig. 2. The four 25-h.p. motors, which also run at 715 r.p.m., drive (*a*) tilting and belt conveyors, (*b*) No. 1 creeper and retarder, (*c*) No. 2 creeper, fig. 4, right, and (*d*) raw-coal elevator in the washery.

The 600-A feeder for supplying power for the screens and washery is brought to a G.E.C. oil-immersed industrial-type draw-out pedestal unit adjacent to an ironclad distribution board situated in one of the sections of the building which accommodates the screening plant. This board consists of eight units. Four are built up of 100-A "Salford" switches and fuses with auto-transformer starters, controlling the four 70-h.p. motors. The remaining four units comprise 50-A. "Salford" switches, one including an auto-transformer starter controlling a 25-h.p. motor, the other three feeding to distant points. On the left of this board is a small 220-volt lighting board, built up principally of G.E.C., d.b. switches and cut-outs, which is fed from a 15-kVA, 440/220-volt G.E.C. Scott-connected lighting transformer.

The supply for the No. 2 colliery workings and certain other purposes is taken from the a.c. board in the power house to a G.E.C. industrial-type oil-immersed draw-out switchboard in a house at the far end of the colliery section. This board comprises three units, one for the incoming cable, one controlling a 10-h.p. fan motor (housed in the same building), and the third controlling a 400-A underground feeder.

The cable used in connection with this contract totalled over three miles in length. The cable run for the a.c. circuits, 3-core, 0.5 sq. in., p.i., l.c., double-wire armoured, complies in every respect with the appropriate British Standard Specification for working pressure up to 660 volts, and also meets the Home Office requirements for the use of electricity in mines. Of the large number of "Osram" lamps employed throughout the undertaking, of particular interest are the "daylight" lamps in use over the belts in the screening section, which considerably facilitate picking operations.

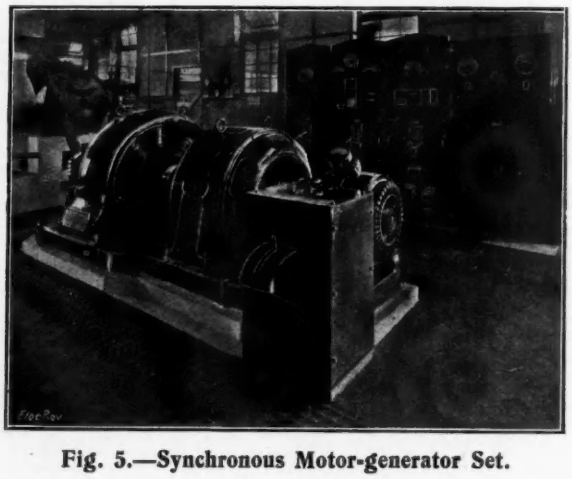


**Fig. 5.—Synchronous Motor-generator Set.**

We are indebted to Mr. G. E. Aeron Thomas, director and secretary of Emlyn Colliery, for permission to publish the above description and photographs.

## Electrical Advertising.

Modern developments in the application of electric lighting to advertising were dealt with by Mr. W. Imrie Smith, B.Sc., in the course of a recent address to the Glasgow Publicity Club. He described electric lighting as one of the greatest assets in all forms of publicity work, and said that display lighting was one of the cheapest and best forms of advertising.

# Omnibus Electric Lighting.

### The Practice of the London General Omnibus Co., Ltd.

LECTURING on the above-named subject at a meeting of the Illuminating Engineering Society at the Home Office Industrial Museum, London, recently, Mr. H. Stallan (engineer's department, L.G.O.C.) said that the first problem was to generate a current on a variable-speed petrol-driven vehicle. During 1911-12 the London General Omnibus Company commenced seriously to equip its 'buses with electric lighting sets; the dynamos were of the constant-current type with three-brush regulation, the current being kept constant by flux distortion, the voltage being controlled by the battery as the speed increased. The disadvantage of that type of machine was that the current increase was proportional to the battery voltage: therefore, when the battery was fully charged the charging current was high, with the result that the machines were invariably overloaded, causing them to burn out; furthermore, the efficiency of that type of dynamo was very low.

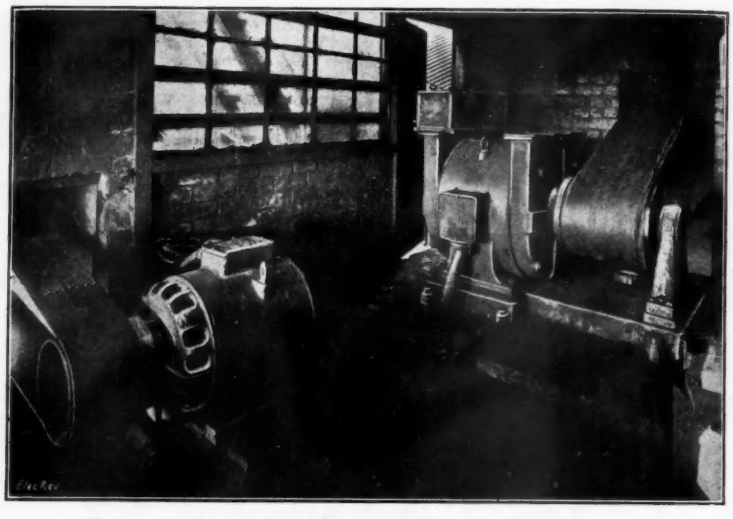


**Fig. 4.—70-h.p. Screen and 25-h.p. Creeper Motors.**

During the past three years considerable progress had been made with the constant-potential dynamo and that type was now being extensively fitted. It possessed two advantages over the constant-current type: first, the battery was kept fully charged, and as the battery voltage increased the charging current decreased, protecting the dynamo and the battery from overcharging; secondly, the machines were of the ordinary shunt-wound type, the power required to drive them being proportional to their output.

Driving the dynamos was another difficulty, because the 'bus engines were not originally designed for that purpose, the result being that owing to lack of space difficulties occurred due to the belt slip. One redeeming feature of the belt drive, however, was that owing to the quick acceleration and deceleration of the engine belt slip often saved the armature core being sheared from the spindle, the early method of fixing not being good. During the last two years the increased use of 6-cylinder engines had simplified the arrangement for positively driving the dynamo, which was directly driven by the magneto shaft, running at 1½ times the engine speed. To disconnect the dynamo from the battery at low engine speeds, and so prevent the latter motoring the former, an auto cut-out was fitted. For the constant-potential machine, in addition, a regulator was provided which automatically inserted resistance in the shunt field of the dynamo by means of vibrating contacts.

The accumulators had been one of the most expensive and most unreliable parts of the early equipment, but several manufacturers had given special attention to the manufacture of accumulator plates to stand the heavy vibration and variable charging rates obtaining on a road vehicle.

The head room in a 'bus was generally much less than in an electric train or tramcar. Originally the L.G.O.C. had had to use miniature fittings, but now ordinary bayonet cap fittings were in use, made possible in the interiors by desing a special lampholder to take up considerably less height than the standard patten; further, the large fittings allowed cables to be looped in, thus obviating joints. Owing to the lack of head room they had been compelled to fix their lamp fittings close to the ventilators which ran along the sides of the 'bus, the police regulation only allowing 5¼ in. inside the body. The disadvantage of that arrangement was that a great deal of light was thrown into the road; in addition, the early bulbs had to be enclosed in an outer well or dish glass. Three years ago, on the introduction of the pipless lamp, sanction was obtained to abolish the outer glass, which was a decided improvement and also saved weight.

The actual illumination of the 'bus when the dynamo system was first adopted was not very high. The interior was fitted with six 10-watt metal-filament lamps, the total number, including regulation lamps, being 12. To-day they had twenty-four 12-watt lamps inside the larger 'buses, with a total of 47 lamps as the complete equipment of the vehicle, the increased wattage being over 350 per cent., with an increase of seating capacity of 100 per cent. Owing to the difficulty of keeping externally-frosted lamps clean, they had had to generally adopt clear bulbs of the metal-filament type. A considerable amount of glare was experienced, but during the past three years they had geen gradually eliminating the clear vacuum type in favour of the "opal" gasfilled lamp. Originally lamp life was very short, due to the fluctuating voltage, but with the advent of the constant-potential system a great improvement in this direction had been noticed. Experiments showed that opal lamps distributed the light much better than internally-frosted lamps; the light loss with the "opal" bulb compared favourably with that of the interally-frosted bulb. Further, the internally frosted type, from the point of view of appearance, did not go well with the white ceilings of the 'buses.

Recently improved types of omnibuses had been designed. Internally their domed roofs extended approximately 8 in. below the cant rail, greatly improving their appearance. They had utilised a section of the dome with a translucent material illuminated from behind, so obviating obstruction and at the same time obtaining a diffused lighting effect. As glass could not be used for that purpose, they had obtained a non-inflammable celluloid which had white pigment mixed into it during manufacture. That had increased the illumination by 100 per cent., and new vehicles would shortly be fitted with that material, which was known as "Aceteloid." The lighting intensity at the average reading height of the new 'buses fitted with that material was about 6 foot-candles. That system, when further experiments had been completed, would provide a pleasing concealed-lighting system for omnibuses.

It might be of interest to lighting engineers to know that recently the London General Omnibus Company had obtained sanction to use illuminated destination blinds, instead of externally-illuminated boards. Owing to the small amount of room available it had been found that clear bulbs did not illuminate the blind properly, which defect had been overcome by fitting "opal" bulbs that gave a very evenly distributed light by which the wording became clearly visible.

With the growing demand for more light and electric power on omnibuses, the size of the generator would become too large to be reasonably driven by the existing engine and, eventually, there was but little doubt that independent lighting plant would have to be installed. Experiments had already been carried out with plant driven by a single-cylinder engine and, except for vibration, it was quite successful and worthy of consideration. Possibly by utilising a two-cylinder engine efficient plant might be obtained for lighting big vehicles. An arrangement of that description had many advantages over the present variable-speed system driven from the main engine.

# Electricity and Gas in Germany.*

## A Comparison of Costs Based on Everyday Use in the Household.

THE question of the most suitable source of energy for heating and cooking is in the forefront of public interest to-day. Coal is steadily falling out of favour, and strenuous competition between gas and electricity exists, and is not always carried on in a purely scientific spirit. Attempts to base

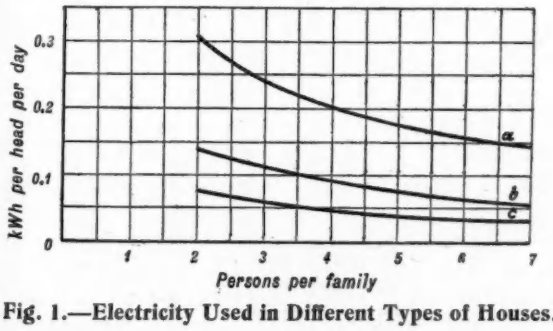



**Fig. 1.—Electricity Used in Different Types of Houses.**

the comparison strictly on the relative costs of energy are seldom conclusive as often other circumstances, such as convenience, reduction of work, cleanliness and hygiene, are the deciding factors. In such respects electricity is admittedly in advance and its use for cooking purposes increases steadily, almost independently of the question of the direct cost of energy.

Numerical comparisons on the bases of cost and energy are, however, published from time to time with a view to proving the disadvantages of electricity. Even if these were

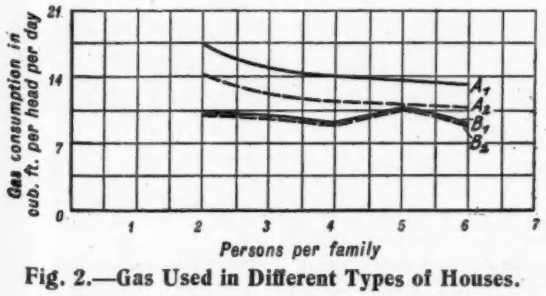



**Fig. 2.—Gas Used in Different Types of Houses.**

true they could only delay its advance, whilst, if false, it is important to substitute reliable figures for both gas and electricity which are above suspicion, and which may be of service to architects and builders in connection with new housing schemes, etc. Such representative figures are, however, very difficult to obtain, so that frequent attempts to arrive at comprehensive figures from special individual experiments have been made, but the results are inconclusive, because of unavoidable deviations from ordinary household procedure, and also because of the differences in method which should obviously be adopted when cooking in the one case with high temperature, open gas flames, and in the other with the comparatively low temperature, closed electrical apparatus. Another point in connection with such laboratory cooking experiments

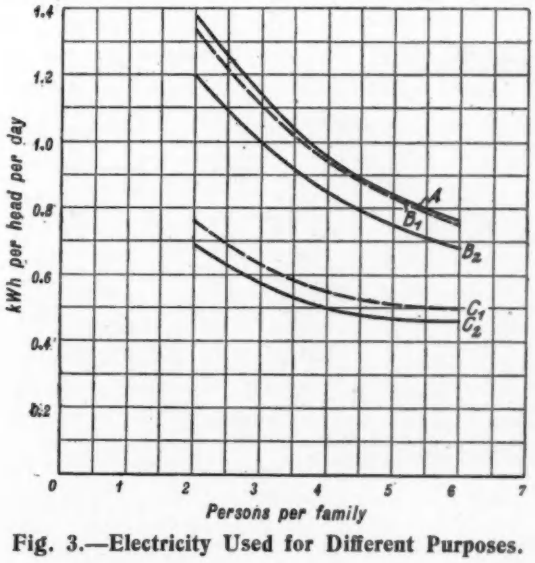



**Fig. 3.—Electricity Used for Different Purposes.**

must not be forgotten, *viz.*, that the gas burners will be working under their optimum conditions, after careful adjustment by skilled experts, a state of affairs seldom met with in ordinary household use.

The only safe way of obtaining reliable comparisons is, clearly, from figures taken in ordinary, everyday use, and the more numerous and varied the households considered the more reliable the results will be. Further, in making such estimates the different purposes for which the energy is used should be distinguished, especially as regards the question of water heating. In fact, three types of installation can be distinguished:—

1. Those in which the cooking apparatus is used both for

* Abstract of a paper by Dr. F. H. Mueller and Herr F. Mortzsch in "Elektrizitätswirtschaft," 1929.

the preparation of food and for all hot water used in the kitchen.

2. Those in which separate water heaters (either of the storage type or the geyser type) are used for the kitchen hot water or for the kitchen and bathroom hot water.

3. Those in which the kitchen cooker is used for food preparation, whilst a separate central hot water system is provided.

Case 3 is not a common one, and so may be left out of account for the present.

Additional difficulty is often introduced by the fact that a

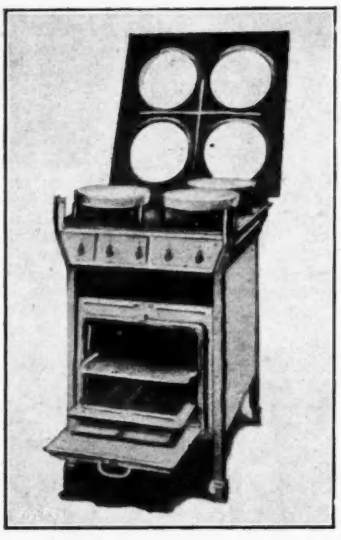


**Fig. 4.—Electric Cooker with Hotplates.**

single electricity meter is used for heating, lighting, and portable apparatus; whilst in households which still employ gas for cooking the lighting is very commonly by electricity, whilst portable apparatus, such as irons, hair driers, hot cushions, ultra-violet ray lamps, &c., is also electrically operated, because of the convenience of the wall plug. Consequently the quantities measured represent the whole energy in the case of electricity, but often only the pure cooking load in the case of gas. If a true comparison is to be made, therefore, some idea of the deduction necessary for the lighting and portable apparatus load must be arrived at. By collecting information from a large number of (German) electricity supply stations with regard to households in which no electric cooking is done, the authors have been able to draw up the curves in fig. 1.

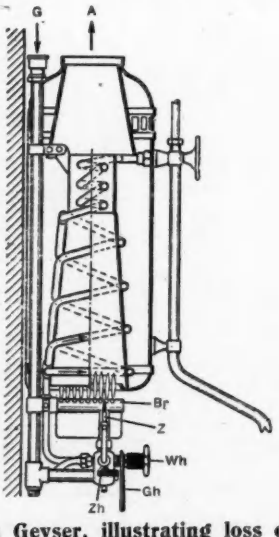



**Fig. 5.—Gas Geyser, illustrating loss of heat in internal spaces.**

This shows the consumption in kWh per head per day for lighting, heating and portable apparatus in three different classes of households from the simplest to the well-to-do and for families of various sizes. Curve (a) refers to better class households in which there is no stint of lighting, heating, or in the use of various kinds of portable apparatus. Curve (b) refers to average middle-class households, and curve (c) to the simplest households, in which there is the minimum of lighting, and practically no consumption of electricity for any other purpose.

It will be seen that no universal average figure can be deduced, but it would seem that for all ordinary cases some such figures as shown in curve (b) lying between .14 and .07 kWh per head per day, would need to be subtracted from the electricity consumption figures in order to arrive at the pure cooking load.

The difficulties are greater still when an attempt is made to arrive at reliable figures for gas consumption in average households. To begin with the consumption is measured in cubic feet of gas of variable heat value and variable pressure, instead of in true energy units like the kWh. Consequently, the question of the heat value of the gas is involved and this value is not always easily obtained. The following figures have all been reduced to the normal German gas mixture having an approximate heating value of 3,500 kg. calories per cubic metre (395 B.th.u. per cubic foot) at 15 deg. C. and 760 m.m.

Another trouble with gas is the fact, as mentioned above, that the efficiency of operation depends considerably on the careful adjustment or otherwise of the burners so that in comparing experimental results it is important to know whether the apparatus is working under normal household conditions or under special experimetal ones. In the case of electrical appartus the efficiency remains practically unchanged throughout its life.

In this connection it is as well to point out that the great variety of electrical apparatus on the market can be broadly divided into two quite distinct types:—

(1) Cookers with hot plates (such as fig. 4).

(2) "Economic" cookers (fig. 6), with heat insulated, closed, cooking chambers. These are often provided with automatic heat regulators which put the current on and off as required in order to keep to any given uniform temperature, thus effecting a considerable saving over hand-regulated apparatus. The multi-cooker, in which several saucepans are superimposed, also belongs to this class.

Bearing in mind these various qualifications it is now possible to proceed with a detailed comparison.

I. *Kitchen without separate water heater and in which both the cooking and the preparation of all hot water is carried out in the ordinary cooking utensils.*

1. *Electric Kitchens.*—The best collection of figures for electric kitchens of this type is the one recently made in Switzerland by Härry.* This comprised 1,125 households in the canton of Zürich of middle class standing (farming and industrial families). His average results for families of various sizes are represented in fig. 3, together with the average of a large number of similar results obtained from German households as published from time to time by the various supply authorities. Curve A gives Härry's Swiss results for consumption in portable and cooking apparatus (electric irons, hot cushions, vacuum cleaners, &c.) for which a plug connection was provided on the electric cooker, but excluding lighting.

Curve $B_1$ ditto for German households, but with lighting consumption included (hot-plate cookers).

Curve $B_2$ the same as $B_1$ but excluding lighting, room heating, and portable apparatus.

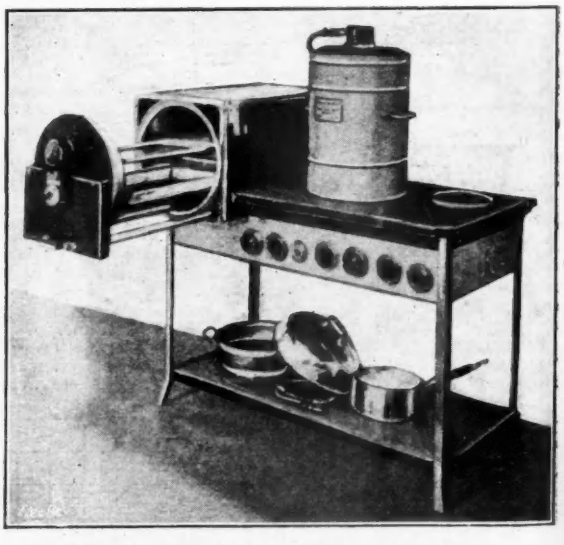


**Fig. 6.—"Economic" Electric Cooker.**

Curve $C_1$ German household consumption for cooking, lighting, heating, and portable apparatus in kitchens in which the special "economic cookers" were employed.

Curve $C_2$ the same as $C_1$ but excluding the consumption for lighting, heating, and portable apparatus ("economic" cookers).

The results for German households may, therefore, be tabulated as follows:—

* Bulletin of the "Schweizer Elektrotechnischen Verein," 1928. No. 15. P. 477.

TABLE I.—HOT PLATE COOKERS, NO SEPARATE WATER HEATER.

| Persons per family ... | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| Average total consumption per head per day ... | 1.34 | 1.11 | .94 | .84 | .75 |
| Average consumption for lighting and portable apparatus, per head per day ... ... ... | .14 | .11 | .09 | .08 | .07 |
| Average consumption for cooking alone, per head per day ... ... ... | 1.2 | 1.0 | .85 | .76 | .68 |

TABLE II.—SPECIAL "ECONOMIC" COOKERS, NO SEPARATE WATER HEATER.

| Persons per family ... | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| Average total consumption per head per day ... | .76 | .63 | .55 | .52 | .5 |
| Average consumption for lighting and portable apparatus, per head per day ... ... ... | .07 | .06 | .05 | .04 | .04 |
| Average consumption for cooking alone, per head per day ... ... ... | .69 | .57 | .5 | .48 | .46 |

2. *Gas kitchens.* Here again, the most complete and up-to-date figures are those obtained by Härry. His gas cooking data refer to 200 small houses in the suburb of Zürich, 230 households (mostly railway personnel) in a small country town, 100 households (middle class, higher class and business people) in a large suburb of Berne and 330 households in another Berne suburb—870 households in all. His results are reproduced as curve $A_2$ in fig. 2. All the houses employed coal gas with an average thermal value of 4,300 kg. calories per cubic metre (485 B.th.u. units per cu. ft. When this is reduced to average German gas quantity (3,500 kg. calories per cubic metre) Curve $A_1$ is obtained. Curves $B_1$ and $B_2$ refer to some figures collected by Bertelsmann* from 149 "selected" families in a number of Berlin suburbs. In view of Härry's very much more numerous results curves $B_1$ and $B_2$ cannot be considered as anything but a lower limit of gas consumption and certainly not as a true average for German households.

3. *Comparison of Gas and Electricity Consumption.*—Although the value of such merely numerical comparisons must not be over-estimated they have a certain importance, if only for the purpose of combating false information sometimes circulated on the subject.

The comparison for Swiss conditions as given by Härry's figures works out as follows:—

TABLE III.

| Persons per family ... | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| Consumption of electricity in kWh per head per day ... ... ... | 1.38 | 1.14 | .95 | .85 | .76 |
| Consumption of gas in cu. ft. per head per day (heat value 395 B.Th.U. per cu. ft.) ... | 17.7 | 15.2 | 14.3 | 13.8 | 13.4 |
| Ratio of kWh of electricity to cu. ft. of gas | .078 | .075 | .066 | .061 | .057 |

Similar authoritative figures are not available for Germany at present, but using such figures as are obtainable and reducing them to the same conditions as in the case of the Swiss results, the authors arrive at the average ratio of about .063 for a German family of four persons using ordinary hot-plate cookers.

The results are considerably more favourable towards electricity when the cooking arrangements are of the "economic" type described above. For this case the ratio of kWh per head per day to cu. ft. per head per day for families of four, works out as .04. Even taking the very low gas consumptions given by Bertelsmann (fig. 2, curve B) this ratio is .054, so that the costs would only become equal if the charge for 1 kWh of electricity is some 18 times that of a cu. ft. of gas (or 1/55 of that for 1,000 cu. ft. of gas).

*(To be continued.)*

# New Swiss Tramway Stock.

## Features in the Design of Electric Trailer Tramcars.

**(Communicated.)**

THE Zurich-Oerlikon-Seebach Tramway Co. has recently put into service four new two-axle motor tramcars and four trailer cars (fig. 1) whose mechanical design differs in the main from the older type in that the floor level has been lowered to that of the end platforms, thus dispensing with the step between the inside of the car and the platforms. In order to enable the floor to be lowered, the diameter of the running wheels has been reduced from 31 in. and 33 in. to 24 in. Cross seats have been adopted on both the motor-equipped and trailer cars. The former have accommodation for 20 sitting passengers and for 21 standing on the end platforms; the trailers accommodate 20 sitting and 25 standing fares.

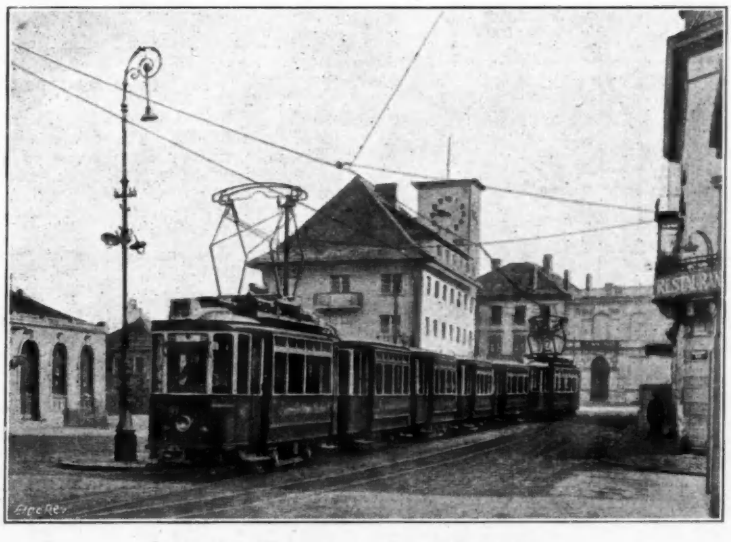


Fig. 1.—Motor-tramcars with Trailers.

The driving equipment of the motor vehicles was constructed by the Oerlikon company. Each axle is equipped with a self-ventilated motor (fig. 2), having a one-hour capacity of 80 h.p. and a continuous rating of 58 h.p., measured at wheel rim, and designed for higher speeds than formerly; curves showing its characteristics at continuous and one-hour ratings are given in fig. 3. The torque is transmitted from the motor shaft to the driving wheels by means of double-reduction gearing having a total ratio of 8.55 to 1. The gears are enclosed and run in oil, the gear box also carying the roller bearings of the intermediate shaft and of the driving axle. Two special ball bearings are also provided to take the axial thrust of the bevel gear. The arrangement of motor and gear box bolted together, so that they can be detached from each other after the removal of the bolts, makes it possible to dismantle the motor or the gear box independently.

The armature winding of the motors is of the bar type with mica insulation, as in the case of standard guage motors. The motors are ventilated by means of a fan mounted on the side of the armature opposed to the commutator. The cooling air, drawn from the outside, is introduced through sheet-metal entrance ducts mounted on both sides of the motor casing and fitted with dust catchers. The cooling air flows in parallel streams over the field and interpole coils, as well as through longitudinal ducts inside the armature, and escapes from the motor into the open, on the opposite side of the fan.

The control equipment of the motor-equipped cars is arranged for operation with single and two-unit trains; direct control

* "Gas and Wasserfach," 1928. No. 35. P. 856.

is resorted to, so that complicated contactor gear is dispensed with. The 550-V current required for driving the whole train is taken from the contactor line by the pantograph current collector with double bow on the leading motor vehicle only. The control arrangement differs from the mode formerly used, in that when changing over from operation with single-unit train to operation with a two-unit train, an auxiliary drum on the controller equipment has to be reset both on the leading

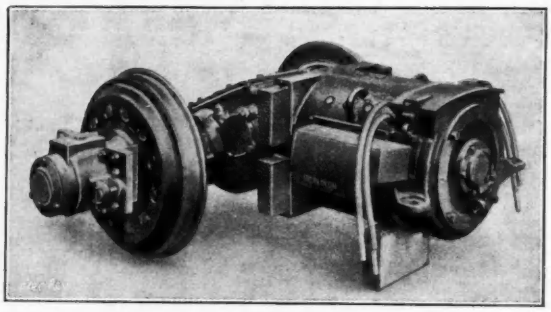


**Fig. 2.—Motor and Gear Box.**

car and on the end vehicle in order to obtain the correct connection for operation with two-unit trains. The same auxiliary drum serves also to ensure the correct stepping down of the starting resistances for operation with single and two-unit trains, the control thus becoming very simple. Furthermore, care has been taken to ensure that, in the event of the auxiliary drum being accidentally set in the wrong position by the driver, no damage can ensue.

The controllers (fig. 4) are of the so-called cam type, *i.e.*, they are built on the same lines as the Oerlikon step switches for single-phase locomotives. The individual contacts are designed as roller contacts, each of which has its own magnetic blow out, the coil of the latter being arranged in series with the corresponding rupturing contact. The controllers are also provided with a device by means of which, in the event of the control handle being given a certain backward displacement, the contacts previously inserted in circuit open automatically and simultaneously. The driver is thus compelled to bring back the main handle to the zero position; consequently, the whole starting resistances are in circuit when starting up again and the starting operation takes place in the usual way by cutting out the resistances. This automatic closing down is instantaneous and all the switching units in circuit take part in the process, the current being thus well subdivided, so ensuring minimum wear of the contacts. When the controller is on the braking notches, the switching-off device is put out of action as, during braking, resistances have to be cut in or cut out, according to the speed desired.

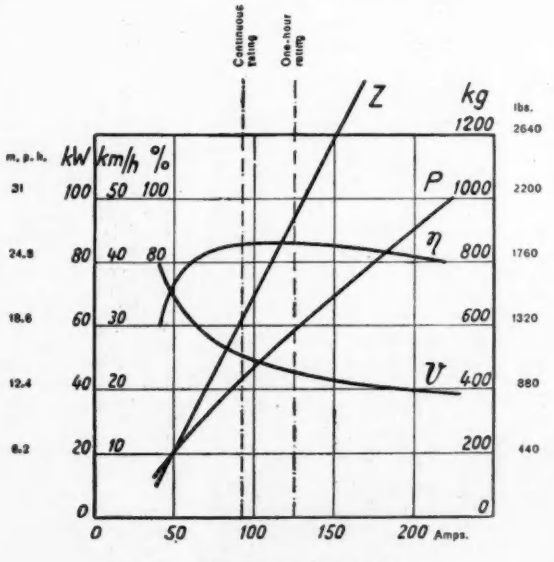



**Fig. 3.—Performance of Motor.**

The control permits of electric short-circuit braking, both with single and two-unit trains. In the case of two-unit trains, too, the traction motors run as generators and work, in both motor vehicles, on suitable braking resistances, in accordance with a special method devised by the Oerlikon Company.

In the case of the trailers, braking is done by means of solenoid brakes, excited by the short-circuit current of the traction motors working as generators. The mode of control necessitates only the use of a two-pole coupling. A third coupling for the brake current circuit is arranged in the face of the buffer of the train coupling and is connected and disconnected automatically when coupling or uncoupling the latter. The couplings for the lighting, heating, and emergency brake circuits are independent of the above-named couplings.

Both motor-equipped and trailer cars are also fitted with electro-magnetic brakes; these are used, not only for bringing the train to a standstill at the stopping places, but also as emergency brakes. In addition to this, there is in each vehicle an emergency handle by means of which the passengers can stop the train in case of danger. It is even possible, in the event of a portion of the train becoming uncoupled, to bring the uncoupled section to a standstill by means of the rail brake, as an arrangement is adopted whereby, in the case of two-unit trains, the motor vehicle at the end of the train runs with the current collector raised; the collector does not, however, then serve to supply current for driving the train, its purpose being merely to take the necessary excitation current for the rail brake. When the emergency brake comes into operation an alarm bell on the motor vehicle is automatically brought into operation. The wheels are fitted with inner block brakes; the brake itself is countersunk in the wheel centre and is thus protected against dirt.

The motor-equipped cars have a length of 31 ft. 10 in. measured over the buffers, and a maximum width of 7 ft. 2 in. The wheel base is 8 ft. 6 in. The floor is 28 in. above the upper surface of the rail. A step is provided for entering the coach, it being at a height of 23 in. above the ground. The dead weight of a completely equipped motor coach amounts

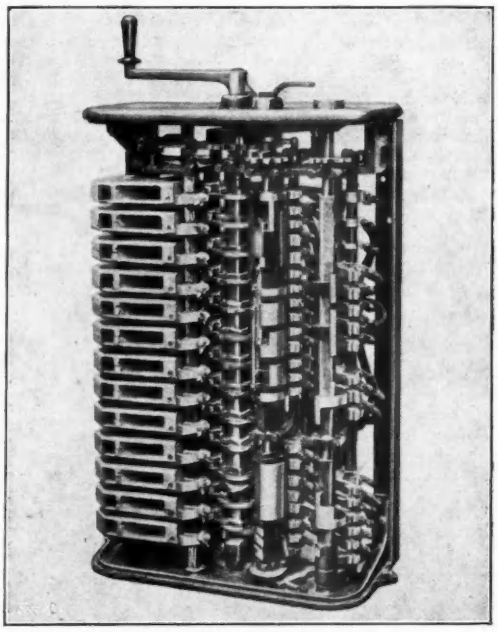


**Fig. 4.—Cam-type Controller.**

to 13 tons 3 cwt. The dimensions of the trailer coaches differ only slightly from those of the motor vehicles; the length of the body is 28 ft. 10 in., as compared with 28 ft. 6 in. for those with motors. The dead weight is 7 tons 4 cwt.

## Distant Control of Garage Doors.

According to the *Revue Generale d'Electricité*, Mr. Louis Martenet, chief engineer of the Service d' l'Electricité in Neuchatel, Switzerland, has devised a method of distant control of garage doors by means of Herzian waves. This invention makes it unnecessary for a motorist to get out of his car to close or open the garage door, either when going out or when returning.

The garage is closed by a metal shutter moved by an electric motor, which can be set in motion by an ordinary contact button, placed in an alcove outside the building, of which he has the key, or by a Herzian-wave receiver. On the vehicle is a wave transmitter connected to an induction coil, the primary circuit of which is fed from the car battery through a switch. On leaving the garage in the car, the driver takes with him the garage-key, which alone enables the wave transmitter to be operated.

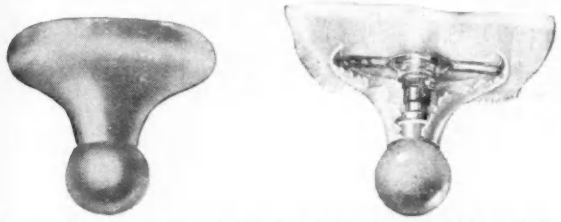
To put the car back in the garage, he raises the shutter by means of the wave-transmitter, and in going out himself he lowers the screen by pressing the control button in the alcove.

# New Electrical Devices, Fittings, and Plant.

**Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.**

## A New Ceiling Lighting Appliance.

A new ceiling lighting appliance by Messrs. PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, is specially designed for use with "Argenta" lamps of 40 to 75 W and is made of 3-ply opal glass. It is neat in appearance and easily erected,



**Figs. 1 and 2.—New "Philips" Ceiling Lighting Unit.**

providing, it is claimed, an efficient, attractive and economical means of lighting corridors, porches, and small rooms. The method of erection is simplicity itself, the fitting being secured in an instant by means of an ingenious spring clip which is held against the ceiling by the batten holder. When the lamp is inserted in the holder it appears to form part of the ceiling plate, the light from the neck of the lamp showing through the opal glass. The design of the unit precludes, it is claimed, any possibility of dust collecting, and having no exterior metal parts, it is very hygienic and easily cleaned.

Fig. 1 shows the "Philips" ceiling fitting complete, and fig. 2 depicts its method of erection.

## A High-voltage Indicator.

A convenient and reliable means of testing high-pressure cables and apparatus up to 15,000 volts is provided by the portable high-voltage indicator, fig. 4, recently introduced by PHILIPS LAMPS, LTD., Philips House, 145, Charing Cross Road, W.C.2. The instrument consists of a neon tube enclosed in an insulated cover of convenient dimensions. This is provided with a case of similar insulating material, which serves as a handle when the instrument is in use, fitting over the end in the manner of a fountain-pen cap. When in use an earth connection is made to the terminal provided, and the hook at the end of the instrument is brought into contact with the wire or apparatus to be tested. Should the circuit be alive, the neon tube will glow, the light being seen through a slot in the insulated cover. Absolute safety in using the instrument is assured, and it is claimed that there is no danger of short-circuiting, and that the neon tube will not fail to give a correct indication.

## An Artistic Wall Fitting.

The accompanying illustration, fig. 3, is of a glass wall fitting with a silk hanging cord and tassel which has recently

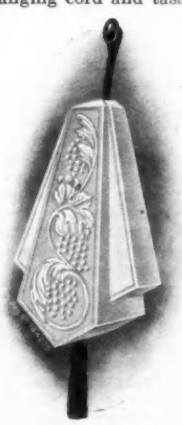


**Fig. 3.—Hailwood and Ackroyd Wall Fitting.**

been introduced by Messrs. Hailwood & Ackroyd, Ltd., Morley, near Leeds. It is supplied in the makers' "Moon-Halo" style, *i.e.*, satin finished, or tinted in hot sun (orange), or peach (pinkish). The fitting is also supplied with an aluminium back plate with a lampholder, and all that is necessary in order to fix the fitting is to fasten the backplate to the wall and hang the glass wall box so that it comes over the electric lamp. The dimensions of the appliance are 10 in. long by 6 in. wide.

## New Street-lighting Apparatus.

Considerable improvements both in practical and ornamental street lighting fittings are being made by a large number of supply engineers to their public lighting services, and manufacturers have played no small part in helping forward this progress by designing suitable units for the purpose. Among the outstanding manufacturers of street lighting appliances is the REVO ELECTRIC CO., LTD., of Tipton, Staffs., which has a very wide range of plain and ornamental fittings suitable for from 60-watt lamps to 1,500-watt lamps. The company has

**Fig. 4.—"Philips" High-voltage Indicator.**

**Fig. 5.—The "City" Street-lighting Standard.**

specialised also for many years in the manufacture of lamp standards, both plain for side street lighting and ornamental for main streets. Fig. 5 shows the "City" street-lighting standard and fitting made by the Revo Co. The fitting is the makers' "Whiteray" model, which consists of a cast-iron gallery with a sheet-steel vitreous-enamelled canopy, and a 16-in. opal glass globe suitable for a 500-W lamp. The column is 10 ft. high to the spigot, and it can be supplied with a door in the base. The bracket is of heavy cast-iron with a 4-ft. spread. The overall height of the complete standard, with fittings, is 15 ft. 3 in., and the maximum width is 4 ft. 10 in.

## Electric Vehicles in Germany.

A return lately issued by the German Ministry of Finance shows there are now only 614 electric vehicles in use in Germany, as against 681 a year ago.

# Electrical Accidents in Mines.

## Extracts from the Report of H.M. Electrical Inspector of Mines for the Year 1928.

(*Concluded from page* 1160.)

*Cornsilloch Colliery.*—An explosion occurred at a machine-cut coal face in the Kiltongue seam, whereby four men were burned, two of whom died subsequently. The source of ignition was severe arcing between one of the two contact tubes in the rectangular plug on the coal-cutting machine and the plug case. This arcing was due to the breakdown of the bushing insulator, the system being direct current at 500 volts. The conditions were wet. At the moment of the explosion the machine was standing. The design of the plug and socket was such that it was an open coupling, so far as the risk of igniting firedamp was concerned, there being two openings in the sides of the sockets, *viz.*, for the securing pin, sometimes called the earthing pin, and for an interlocking cam on the operating spindle of the switch. The most probable cause of the failure of insulation in the plug was the destruction of the insulating bush by heat arising from poor contact between the contact tube in the plug and the contact pin in the socket. Particles of damp coal filled the opening in the side of the plugbox, but the end of the plug was clear of such foreign matter.

*Temple Pit, Waterloo Main Colliery.*—An explosion occurred in a gate road causing the death of three men who were engaged in an endeavour to clear away gas that had accumulated at the face while the mine was closed for the Easter holiday, in order that cutting with an electrically-driven coal-cutting machine might be resumed. In the gate road, 25 yards from the face, there was an electrically-driven forcing fan for auxiliary ventilation which had been standing pending the clearing of the gas from the face. The fan motor was a 3-phase squirrel-cage 600-volt induction motor: it was controlled by an oil-immersed star-delta starting switch of the ordinary industrial type. There was conclusive evidence that the electrical circuit was complete and that it was alive up to the fan motor switch, and there is a strong presumption that an attempt had been made to start the fan. The condition of the fan motor switch warrants the belief that firedamp was ignited by the use of the switch. The switch case was not flame-proof in design, and it was in a defective condition. The frame appeared to have been erected out of plumb, with the result that the effective head of oil over the switch contacts was reduced, while the quantity of oil was insufficient to provide the full designed head even when plumb; the top casting and the oil tank were insecurely fastened, and the insulating plate carrying the contacts and mechanism was loose, while there were indications that an arc had been struck at some time between phases at or above the level of the soil.

### Non-fatal Accidents and Dangerous Occurrences.

There were 55 notifiable non-fatal accidents and dangerous occurrences attributable either directly or indirectly to the use of electricity, involving injury to 56 persons, in addition to 15 persons who were injured in five of the fatal accidents.

With the exception of one accident at a quarry, all of these accidents occurred at collieries, *viz.*, 42 below-ground and 12 above-ground.

Approximately one half the number of accidents were associated with the use of trailing cables and plugs.

### Short Accounts of Three Selected Dangerous Occurrences.

*Windsor Colliery, Glamorgan.*—A 3-phase system, with earthed neutral, operating at 3,300 volts between phases, was fed, through four 2,000-kVA transformers in parallel, from the transmission system of the Powell Duffryn Steam Coal Company, Ltd., and there was also synchronous plant at bank on the 3,300-volt busbars.

A branch circuit to a 215-h.p. main and tail haulage motor was protected, at its origin, by a circuit-breaker with overhead and leakage trips, while to protect the motor and its controller there was a circuit-breaker with overhead trips only; both of these breakers had a rated rupturing capacity of 15,000 kVA.

The setting of the overhead trips was 80 amperes, with time-lag. The circuit-breakers were of the oil-immersed metal-clad type with boiler-plate tanks.

The haulage motor was controlled by an oil-immersed reversing controller of the horizontal-drum type, with cast-iron enclosure.

While an empty journey was being hauled in-bye the local breaker tripped, and a serious fire developed. Subsequent examination showed that a short-circuit had started on the stator reversing contacts of the controller of the haulage motor, and that in attempting to clear this fault the branch circuit-breaker at the pit bottom had developed an internal short-circuit, which destroyed the tank and set the oil on fire. This burning oil ignited the oil in the tanks of other circuit-breakers in the switch-room, and the fault was cleared by the tripping of the circuit-breakers at bank. The original fault was due, possibly, to an accumulation of metallic dust upon insulating surfaces, or perhaps to a deposit of carbon resulting from the "cracking" of the oil, in the haulage controller. The oil in the controller had been changed eight days before the accident, but the insulating surfaces had not been specially cleaned.

It is calculated that the short-circuit kVA may have been as high as 60,000 kVA, and it is not surprising, therefore, that the circuit-breaker, rated at 15,000 kVA, failed to clear the fault without disaster. After the accident steps were taken to reduce the severity of a short-circuit below ground by inserting reactances, of the air-core type, in the shaft-feeders. This accident, which threw the pit idle and might easily have resulted in loss of life, draws attention to the serious risk that is incurred if the necessary provision is not made when a powerful source of electrical power is substituted for comparatively small local generating sets. It should be observed that the original breakdown in the haulage controller was not of an exceptional nature.

*Maritime Pit, Great Western Colliery, Glamorgan.*—This was a 3-phase system, with free-neutral, operating at 2,200 volts between phases. When winding in unloaded rope an explosion occurred in the controller of a 250-h.p. motor operating a main and tail haulage. The controller was of the horizontal-drum type, oil-immersed, in a heavy cast-iron case, with two ventilators of the usual mushroom type, having circular vents, about 1 inch in diameter, covered with gauze. There was a cover plate about ¾ in. thick, 4 ft. long and 11 in. wide, secured by six set screws; this plate was fractured across the middle. The controller comprised reversing contacts for the stator circuit and a number of selector contacts for the rotor circuit, permitting the inclusion of variable resistance therein. The stator contacts were not involved, but it was found that one of the rotor contacts had been burned off or had fallen off, for it was lying at the bottom of the oil tank. It was observed that there was a conducting deposit of metallic dust and carbonaceous matter on the insulating surfaces between some of the rotor circuit contacts. It appears possible that an accumulation of inflammable vapour in the free space above the surface of the oil may have been ignited by the abnormal sparking arising from the defective contact, and that such abnormal sparking contributed to the production of an unusual quantity of inflammable gas from the oil.

The oil had been changed on September 22nd, and on November 17th three contact tips in the switch had been replaced. The controller had been examined on November 27th, and passed as being in good working condition.

It has long been known to manufacturers of switchgear that certain inflammable gases are produced by the action of the electric arc under oil, and it may be of interest to state here that the composition of these gases has been found to include from 66 to 82 per cent. of hydrogen and from 26 to 10 per cent. of acetylene, which, with a sufficiency of air, will make a highly explosive mixture. Hydrogen is inflammable between limits of approximately 4 per cent. and 74 per cent. with air, while for acetylene the corresponding limits are 2½ and 80 per cent. The small ventilators that are applied to controllers of the type involved in this accident are not intended to afford pressure relief in the event of an explosion, and they do not purport to be flame-proof. Moreover, they are not adequate to ensure rapid evacuation of inflammable gases if produced in quantity, for which purpose much larger vents, and possibly artificially induced ventilation, would be necessary. There is some evidence that explosions in switchgear of this type are usually associated with "inching," *i.e.*, the repeated use of the switch to make-and-break the circuit, so as to move the rope slowly.

The alternative of employing an unvented enclosure involves the possibility of the accumulation of a quantity of highly-explosive gas, which could only escape by diffusion through joints in the structure, and this gas may be ignited by some abnormality in operation. This hazard might be countered by an enclosure of adequate strength to resist an explosion under those conditions, but experimental data are at present lacking.

### Trailing Cables and Plugs.

Approximately half the accidents were associated with the use of trailing cables and plugs. In five cases the plug was handled whilst it was "live" and out of the socket, or it was pulled out whilst "live" to avoid the trouble of switching off at the gate-end.

In five instances there were defects in the cable that the man in charge of the machine might have discovered if he had examined the cable with sufficient care—and knowledge,

assuming that the cable was not damaged during the shift. In five instances there must have been "open sparking" that would have been dangerous if firedamp had been present in explosive proportions.

The common flat plug is not up to the standard, either electrically or mechanically, that is expected to-day of other parts of a colliery electrical installation.

There is, however, an alternative in the British Standard Mining type plug made in accordance with the requirements of British Standard Specification No. 279, 1927.

The primary object of that specification was to secure interchangeability between plug and socket when obtained from different manufacturers, but, incidentally, it is a requirement that the plug and socket, when properly assembled, shall form a "flame-proof" enclosure.

In the general design of the British Standard plug provision has been made for an effective mechanical interlock with the related switchgear, and here is space for an electrical interlock, when such is desired.

### Metalliferous Mines.

No accidents were reported in connection with the use of electricity at metalliferous mines.

There has been an increase in the total horse-power of electrical motors installed of 4,691 during the year; this increase is located mainly in the Midland and Southern and in the Northern Divisions, *viz.*, 62 per cent. in the former and 32 per cent. in the latter.

Electricity was used at 86 mines out of a total of 329 at work. The total h.p. of motors installed was 30,456—18,102 above, and 12,354 below ground.

### Quarries.

There was one accident of a minor character reported at a quarry in the Midland and Southern Division. Considerable activity has been observed in the application of electrical power in clay pits, for brick works, for operating the powerful mechanical diggers, sometimes described as shale-planers, that are rapidly replacing manual labour in that sphere.

Usually 3-phase current is conveyed to the digger by means of a flexible unarmoured "trailing" cable of the general type used with coal-cutting machines. For machines of moderate power medium pressure suffices, but in one recent installation, where the power requirements of the digger aggregate about 400 horse-power, it is proposed to convey 3-phase current at 6,600 volts to the machine by means of a pliable armoured cable. This cable has three cores of multiple stranded copper conductors insulated with pure and vulcanised rubber. These cores are separated by a cradle of tough-rubber compound, and are surrounded with a bitumen filling wrapped with canvas, upon which the armouring of fine stranded steel wires is laid. The armouring is covered with a sheath of tough rubber, in which are embedded two layers of canvas.

It is proposed that the armour shall serve as the earthing conductor for the apparatus.

It is very desirable that in all such installations there shall be "leakage protection" for the circuit in which the trailing cable is comprised, for medium-pressure as well as for high-pressure systems.

The use of unarmoured flexible cables for this service is regarded with considerable apprehension, especially if they are of the simple type, without an earthed metal screen around the live conductors, in view of the rough usage and exposure to which the cable will be subjected inevitably and in view of the probable inexperience of the operatives in the use of such cables.

The experimental use of pliable armoured cables is therefore welcomed.

# Electric Heating.

## The heating of large buildings electrically by means of off-peak thermal storage is economical and competitive.

By Lieut.-Col. S. E. MONKHOUSE, R.E. (T.R.), M.I.E.E., and L. C. GRANT, M.I.E.E.

*(Extracts from a paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS.)

CONSIDERABLE progress has been made with electrical heating in recent years. The higher cost of electrical energy, as compared with the cost of liquid or solid fuels, is compensated for by the advantages of cleanliness, convenience, and efficiency. The authors advocate the more extended use of electrical heating by thermal storage, thus enabling energy to be used during off-peak hours. They contend that such a system is economical to operate, and show that in the case of large buildings it can compete with systems employing other forms of fuel.

What should be charged for electricity supplied under restricted-hour conditions must depend largely upon local conditions, and the authors refrain from making any definite statement on the subject, being content to give data with regard to the cost of operating the equipment they describe, to indicate the maximum cost of electricity at which it would be economical for the user to adopt electric heating, leaving it to the suppliers to decide whether it would be economical to sell energy at a figure which would be competitive with local prices for other forms of fuel.

They, however, express the opinion that, if proper allowance be made by supply undertakings for the appreciable value attached to any load which assists to fill the valleys of the load curve, there should be neither difficulty nor hesitation on their part in quoting prices which would give rise to the extensive adoption of such equipment as is described in the paper.

Storing water heated by off-peak electrical energy in tanks suitably lagged has the important advantage that flues and smoke stacks are dispensed with, and results in an appreciable saving in the first cost of the building and its subsequent cost of maintenance. It has also an appreciable value in making available, for office or other accommodation, additional space with possibly an increased rental value. The operation wages can be eliminated by the adoption of automatic working.

Descriptions of some of the installations now in operation show how the size of building, location of apparatus, and other considerations which influence the general form of the installation.

*Banca Commerciale Italiana di Rome.*—A large electro-thermal heating system was installed some six years ago at the Banca Commerciale Italiana di Rome, Italy, which occupies a ground area of 28,560 sq. ft. and has a total volume of 1,175,000 cu. ft. This installation, probably the first of its size and type in the world, consists of four Mascarini single-phase, 50-cycle, boilers working at 450 volts. Electricity is taken from 11 p.m. to 7 a.m., and the consumption during the first winter of operation was 0.08 watt-hour per cu. ft. per deg. F. rise in temperature.

*Newcastle Motor Depot.*—This plant, installed early in 1925, is believed to be the first of its kind to be used in Great Britain, and consists of a combined storage cylinder and "boiler," the latter of the electrode type fed at 6,000 volts direct from a 40-cycle 3-phase system. The normal load is 20 amperes (equivalent to 200 kW). The building has a capacity of 500,000 cu. ft. and is a difficult one to deal with because there are five doors, each 13 by 10 ft., in frequent use, and a motor-driven ventilation system is used to clear the building of carbon monoxide. Heat is supplied continuously day and night for seven days per week and about eight months per annum, absorbing 210,000 kWh per annum, current being consumed only between 7 p.m. and 7 a.m. No labour charges are incurred in running the plant, and maintenance is practically negligible, as the replacement of electrodes as a precaution was not really necessary.

*Carliol House Installation.*—The authors believe this to be the largest of its kind in use in the world. Separate boilers and storage cylinders are used with intermediate calorifiers. Two 3-phase boilers are each capable of dissipating approximately 1,200 kW at full load at 6,000 volts on a 3-phase, 40-cycle system, each boiler taking approximately 120 amperes per phase. The calorifiers, either or both can be used in conjunction with each boiler, are each capable of handling an average steam output equivalent to 650 kW dissipation and are somewhat similar to surface condensers in arrangement.

The system of radiators installed in the building is of the panel type. Each consists of a grid of ¼-in. internal diameter mild-steel tubing sunk into the concrete ceilings and covered with a thin layer of high-grade plaster supported on scrim cloth. The normal dissipation of each panel is about 8,000 B.th.u. per hour. The temperature of the water supplying the central-heating system is regulated automatically by a relay valve system hydraulically operated and controlled by a thermostat.

The building is incomplete, but that portion which is in use and has been occupied for two heating seasons has an approximate content of 1¼ million cu. ft., and during the

last complete heating period (which was of great severity) required an average daily input of 5,300 kWh, *i.e.*, 18 million B.th.u. The average outside temperature was 44.3 deg. F., and the air in the building was maintained at 63 deg. F. The electrical consumption per office of 2,000 cu. ft. capacity (*i.e.*, suitable for accommodating three or four persons, including its proportion of corridors, entrance hall, staircases, landings, lavatories, &c.), was 46 kWh per week, which (at 0.3d. per kWh) represents a weekly cost of about 1s. 1d. The consumption of current in all cases was confined between 7 p.m. and 7 a.m.

Beyond opening the boilers for annual inspection, which occupies two days, the only expenditure has been the provision of one set of electrodes at a cost of £5.

In addition to the central-heating system there is a separate storage cylinder to supply the domestic hot-water requirements of the building, which derives its heat from the boiler main steam-range.

*Other Installations.*—A Newcastle-upon-Tyne block of offices and showrooms has a cubical content of 300,000 cu. ft. The installation consists of a combined storage cylinder and water-heating equipment. Wound resistance formed into a bank of four heaters, each with a full-load rating of 50 kW, are so connected as to be suitable for 500-volt working, and are controlled in banks by a time switch and thermostat. The temperature of the water circulated through the building is regulated automatically.

The London Underground Railways office building is of 2¼ million cu. ft., requiring 8,000 kWh per hour (average) heating. The plant is required to work on short charging cycles, instead of continuously, at any time other than the 4-hour morning and evening peaks of the traction load of the Underground system. There are four storage cylinders, each fitted with three 100-kW, 3-phase immersion heaters, operating at 380 volts, fed through transformers from the 11,000-volt distribution system.

### Discussion in London.

Two papers* were discussed simultaneously, five speakers taking part in the debate.

It was pointed out that low-grade heat production from electricity had not hitherto been considered worth while, but it had great possibilities. The authors' arguments were sound now and would become still more practicable, and their methods more economical as the conversion of coal to electricity improved, and capital and transmission costs were reduced. The importance of storing heat produced electrically could not be stressed sufficiently, as electricity itself could not be stored commercially. In hot water one had the cheapest and easiest method of storing the product of electricity. Panel heating was particularly suitable for new buildings, but its installation in existing buildings necessitated considerable reconstruction.

The heat pump had received the attention of engineers over 20 years ago, but they were then engaged upon other things which were more attractive. In Switzerland heating boilers were connected direct to 15,000-, 10,000-, and 6,000-volt three-phase systems without worrying about possible neutral point earthing complications. In this country that sort of thing would not be countenanced, but some station engineers were now revising their opinions.

The flexibility of temperature control that electric heating afforded resulted in much less heat being required in a given building. Even the most skilful stoker could not do more than average the heating load variations, some of which he could not even be aware of. Thermostatic control of the temperature in individual rooms had resulted in astonishing economy, so much so indeed as to justify the extra cost involved. Thermal storage saved floor space; in fact, in one case its adoption had enabled a building in London, where sites were very expensive, to be made one storey deeper underground.

The heat pump test figures must be very conservative, as they had all been obtained with plant designed for refrigeration; if the plant had been designed for (not adapted to) the reverse process, higher figures would have resulted. Such plant would be inherently reliable and of high efficiency, even when of small size, which fact was one of its attractive features. Instead of making use of a gas for the process, could the atmosphere be employed? That would involve a larger volume being dealt with, but it would not be a disadvantage if the heating and ventilation of a building were combined.

The authors briefly replied to the discussion.

### 40-ton Coal Wagons.

The L.M.S. Railway recently demonstrated its fleet of 40-ton steel trucks of the self-discharging type. The demonstration took place at the L.M.S. generating station at Stonebridge Park, Middlesex, to which it is proposed to transport coal by these trucks from collieries in the Midlands. At present only a few collieries are equipped with screens suitable for loading into these trucks, whose general use, it is claimed, would do much towards preventing increase in transport costs, which might otherwise be necessary.

* Extracts from the second paper were published in our December 27th, 1929, issue, p. 1161.

# Parliamentary News.

**[By Our Special Parliamentary Reporter.]**

### The Christmas Recess.

Parliament rose for the Christmas Recess on Tuesday, December 24th, and will reassemble on Tuesday, January 21st.

### Electricity and Unemployment.

On December 20th Mr. J. H. THOMAS, the Lord Privy Seal, in the course of a statement upon unemployment, said that when the last Electricity Bill was before the House a few years ago, considerable hope was expressed as to the value of the measure. Not only did he think it would be justified, but he believed it would prove a blessing to the trade and commerce of the country. He had been inquiring as to how far it could be speeded up, the idea being to make energy from the Grid available to all areas in the country. He had succeeded within the last two days, in consultation with the Minister of Transport, in arranging, with regard to the North-East Coast area, that an application should be made to the Unemployment Grants Committee. He hoped that would result in expediting £1,000,000 worth of work on transmission, which would carry with it a further expenditure of £7,500,000 in order to deal with the standardisation of frequency in the whole of the North-East Coast area. All the information he had tended to show that there was nothing so valuable as cheap electricity and the opportunity it would give to manufacturers and industry in that area.

### Local Authorities and Purchase Rights.

On December 23rd Mr. WELLOCK asked the Minister of Transport if he would inform the House of any agreements in existence or contemplated between electricity supply companies in the London and Home Counties Electricity District and local authorities whereby, in consideration of the payment of certain sums of money, the local authorities had agreed not to exercise their right to purchase the undertaking or to terminate an existing lease of any undertaking; and whether he could inform the House of the terms of such agreements. The same member also asked the Minister whether his attention had been called to agreements which had been, or were about to be, entered into between the North Metropolitan Electric Power Supply Company and certain local authorities whereby, in consideration of certain annual payments made by the company to the local authority, the local authority agreed not to exercise its right to purchase the electricity undertakings in its area; and whether he would state what steps he had taken, or proposed to take, to see that arrangements so made or contemplated were in the public interest.

Mr. MORRISON said he understood that in three instances in the London and Home Counties Electricity District local authorities had received payments of the kind in question, presumably in pursuance of agreements entered into with the electricity company concerned, *viz.*, the North Metropolitan Company. The Electricity (Supply) Acts did not require such agreements to be submitted for approval, and he was not in a position to give all the details, and he was not aware whether any further agreements of this kind were contemplated.

### The Jersey Cable.

On December 23rd, Mr. LEES-SMITH, the Postmaster-General, informed Sir B. Falle that the cable to Jersey would be repaired as soon as a cable ship could be spared to undertake the work. Temporary wireless communication was being provided in the meantime, and it was hoped that when the service was stabilised there would be no undue delay in the interchange of telegraphic communications. The telegraph services in Northern France were disorganised by the recent gales, and the transmission of messages, *via* France, to Jersey, was undertaken by the French authorities as a matter of courtesy and at great inconvenience. He could not ask them to do anything further or to forego the transit charges, to which they were entitled under international regulations.

### Underground Schemes.

On December 24th, Mr. O. NICHOLSON asked the Minister of Transport whether he had made representations to secure a connection between the new Charing Cross station and Waterloo station sufficient to ensure through running from the Kentish to the Surrey suburban electric services and the avoidance of terminal congestion.

Mr. MORRISON said that the question of a railway connection between the new Charing Cross station and Waterloo station to ensure through running between the Kentish and Surrey suburban services of the Southern Railway Company, was discussed with the company when the plans for the new Charing Cross station were under consideration, and the conclusion was reached that the travelling public would not derive sufficient benefit to warrant such a connection being established.

Mr. Nicholson then asked the Minister whether he would secure a re-examination of the proposal to construct a deep-level tube railway for fast traffic between Hammersmith or

Earl's Court and the City, thereby relieving rush-hour congestion and providing employment.

Mr. MORRISON said he understood that, in the opinion of the railway companies concerned, with which he was disposed to agree, there were other improvements of London tube railways which were likely to be needed before any such scheme as that to which the hon. member referred. Some of the improvements at Hammersmith for which power was sought in the London Electric Railway Company's Bill of the current session would, if carried out, have the effect of relieving the pressure on the Metropolitan District Railway.

# Legal.

## Ogilvy v. Dundee Corporation.

WE reported in our last issue (p. 1166) that judgment had been reserved in this action, which Sir Herbert Ogilvy, Bt., brought against the Dundee Corporation on account of its refusal to supply electricity to a bleach field belonging to the plaintiff.

Sheriff MALCOLM delivered judgment last week, ordering the respondents to afford the desired supply and to pay the plaintiff's expenses. His Lordship held that the Dundee Boundaries Extension and Gas Order Confirmation Act, 1914, provided that the respondents should, if desired by the owner, give a supply of electricity for Baldovan House and the tenants and feuars on the estate of Baldovan. The issue between the parties was whether this included tenants and feuars on the estate but outside the city boundary, or whether it was limited to tenants and fauars on that part only of the estate, which was added to the city by the extension. In his Lordship's opinion the contention of the plaintiff was right, and the subsection of the Act applied to tenants and feuars outside the added area. The words "if desired by the owner," which were a condition of the supply, seem to strengthen this view. Tenants and feuars within the added area, by qualifying as citizens, became independent of any such desire, and could make their own demand for a supply of electricity. The condition "if desired by the owner" seemed therefore to be conceived in the interests of a class of tenants and feuars who had no such right in themselves, and were dependent on a statutory right given to the owner.

# Correspondence.

***Correspondents should forward their communications* as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

## The All-Electric House.

With your kind permission, I propose to comment on the letters which have followed my original letter that appeared in your issue of November 22nd.

In your issue of November 29th a correspondent, who prefers to remain anonymous, shows first of all that he does not grasp the difference between physiology and psychology. Obviously, it is the second term which he really intends, as he mentions analysis in the first line of his letter.

He then proceeds to draw several erroneous inferences, which I will not waste either your readers' or my own time in exposing.

In your issue of December 6th Mr. W. T. Wardale takes up the cudgels for the heating of rooms and water supplies by electricity.

The contra item which he places against the waste of the natural fuel supply is "the well being, ease, and comfort of our women folk." How many of our women folk in these hard times will contemplate with equanimity the prospect of increasing by roughly 87 per cent. their expenditure on domestic services?

As regards the pollution of the atmosphere, an inspection of my chimney will prove to anyone that no visible smoke whatever is emitted, and the chimney sweep will testify to the negligible amount of soot in the chimney.

As an engineer I am not prepared to uphold the coal fire, which, as I stated in my original letter, was retained for purely sentimental reasons, but, after all, sentiment is a big force in our lives. I would, however, point out the valuable ventilating effect which a coal or coalite fire produces, and which the electric fire cannot provide unless efficiency is sacrificed.

Mr. Wardale asks whether I can start up my gas engine whilst lying in bed. The answer is that it starts up itself when the battery voltage drops to a predetermined value, and in any case the engine is only run during the period of battery charging. For the greater part of the time the battery supplies the house.

If Mr. Wardale has seen a gas cooker with a cowl over it connected by a ventilating pipe to the external air, and also provided with a ventilating pipe from the oven, he will admit that it is possible to reduce the fumes in the kitchen to a negligible amount. I would point out that, even with an electric cooker, there is a considerable amount of steam and fumes given off by the food which is being cooked, and this escapes into the kitchen.

Dealing with the criticism regarding capital charges and upkeep, it should be borne in mind that the comparison which I made in my original letter was between the cost of coal, coke, firewood, and gas used in my house, and the cost of current for all domestic purposes used in Professor S. Parker Smith's house. If capital charges had been stated by Professor Smith, I should have been in justice bound to give them for my house.

Mr. F. C. Platt, also in your issue of December 6th, comments on the fact that I have not debited my system with the cost of coke storage, attention to fires, and removal of ashes. My reply regarding coke storage is that I have ample room in my outhouses for such purposes, and these houses, if not used in this way, would be empty. With respect to the attention to the coke boiler and one coal fire, and the removal of ashes, I would say that this is part of the usual routine of our domestic staff. If coke boiler and coal fire were absent, there would be no reduction in the annual expenditure on domestic staff.

In conclusion I would say that I fully realise the valuable assistance which electricity is able to render in our houses. For such services as lighting, cooking, vacuum cleaning, ironing, and other similar purposes, I consider electricity eminently suitable, but for heating and hot water supply I feel that, with the present method of generation in our orthodox steam stations, it is economically not justifiable to use electricity.

On several previous occasions I have advocated the combined production and utilisation of electric power and heat. Briefly, the system is to use the steam first for generating power and then make available the heat units in the exhaust, by distributing heat in the form of low-pressure steam or hot water.

Several large systems working on these lines are showing good financial returns in the United States of America, and I refuse to admit that we are incapable of operating such schemes with satisfactory commercial results in our own country. I fancy it is our innate caution and suspicion of new departures which prevents us giving a trial to such a system.

The overall thermal efficiency of a combined system on the lines indicated could be brought up to at least 50 per cent., and with favourable conditions to even 60 per cent. The "All electric" house would then become the "Heat-electric house."

**Frank J. Moffett.**

Birmingham, *December 20th*, 1929.

[This letter has been slightly shortened.—EDS. ELEC. REV.]

## Selective Transmission Line Protection.

Having read the report in your issue of December 13th of the lecture on "Selective transmission-line Protection," given before an E.P.E.A. meeting in London, I was surprised to learn that, when using tapered time limits, the lecturer did not think the time intervals of adjacent relays could safely be less than 0.7 second, and that, wtih four stations to protect, a fault near the station might be maintained for well over three seconds. I have in use on an 11,000-volt ring main, 12 miles long, protective apparatus at four points, including the supply point, and the maximum time lag of the apparatus at the supply point is not more than 0.70 second. This apparatus has been in use over two years, and given every satisfaction, it having functioned in correct sequence on every occasion. The sections of the main are controlled by truck-type oil switches, the difference in time settings between the adjacent relays being 0.23 second. The apparatus was described in the ELECTRICAL REVIEW of January 4th, 1929, and is now being manufactured by an English firm.

**D. C. Redfern.**

Musselburgh, *December 20th*, 1929.

## Efficient Buying.

Many of our manufacturers keenly appreciate that the deciding factor in securing the success of present-day industry is the pressing into service of every development in manufacturing processes, wherever there is a prospect of reducing overhead and running costs; but there are many who fail to appreciate the necessity for the same keenness in the all-important buying section.

The old practice of selecting the buyer from the costing office or other clerical departments is often followed, although it is rapidly dying out. Consequently this individual having little or no technical qualifications is only able to use a very limited discretion in the placing of orders, and he purchases what is called for, irrespective of whether it is in the most useful or economical form, from the previous suppliers at the lowest

price quoted by this restricted market, without further competition. Usually none but known suppliers' representatives are seen. Any new development, process, material, machine tool or attachment (shown by a representative fortunate enough to get an interview), although it may be of great value to the firm, is not understood. The buyer is not in touch with the shops or design section, and he cannot appreciate any complaint which may come from the former.

The modern manufacturer who realises that buying when it is in properly trained hands is a far-reaching factor in works efficiency, by its influence on design and manufacture, selects a buyer with wide technical experience, knowing all about the processes through which the material he buys has to pass, and also the circumstances in which it is used, and the most economical form in which it can be purchased.

He is in close touch with the shops and designs section, and any complaints from the former are readily understood. Therefore, knowing all about the circumstances and requirements, he can purchase to the greatest possible advantage to suit them, without necessarily accepting the lowest quotation.

He is always on the lookout for demonstrated technical possibilities, and should any new development, process, material, machine tool or attachment be shown him (all representatives are seen if only for a very brief period), he can quickly see if there is the possibility of it being to the advantage of his firm or not. If the former, he secures, then or later, full particulars and discusses them with the design section or his works manager.

This departure from old practice is a step towards greater efficiency and must benefit industry.

One result, which is already apparent, is the greater number of representatives who have had inside experience and can fully discuss the goods that they represent. Their employers are moving with the times, and realise that the days are nearly over when all that was required of a representative was to be affable and to know the name and price of the goods he was selling. They know that it is essential to train their representatives, if business is to be done with firms having technical buyers.

**Traveller.**

*December 30th*, 1929.

## Thawing Water Pipes by Electricity.

The last three lines of the paragraph on page 1102, under the above heading in your issue of December 20th, should not, I think, pass without comment.

As water in its solid state, namely, ice, occupies more space than when liquid, the bursting of pipes or any closed vessel containing water occurs when the water changes from liquid to solid, and not as this paragraph seems to imply, when changing from solid to liquid, or thawing.

Thawing water pipes by electricity may be a very admirable method, but I cannot see how it can have any bearing on the condition of the pipe, as, if the pipe is burst, this has occurred before any thawing has been commenced.

**Expansion.**

*December 24th*, 1929.

[We assume that the practice is to switch on the current before the pipes are frozen.—EDS. ELEC. REV.]

We have read with great interest the paragraph under "Notes" on page 1102 of last week's issue on "Thawing Water Pipes by Electricity."

Messrs. Koch & Sterzel, of Dresden, whom we represent in this country, have specialised for some years on this particular application of electricity, and have sold many hundreds of transformers specially designed, not only for the thawing of frozen pipes, but also for connecting to water pipes to prevent them from freezing.

**Oswald Record & Co.,**
O. L. RECORD.

London, S.W.1.
*December 27th*, 1929.

## Mathematical Printing.

The use of the solidus (/) instead of the horizontal bar in fractional expressions is an economy of space and convenience of undoubted value, but it sometimes leads to ambiguity troublesome to the reader. An example occurs on p. 1082 of the current issue of the ELECTRICAL REVIEW, in Mr. Smith's article on "Sags and Tensions," equation (2), printed as

$$D_1 = l + 8/3\ s_1^2/l.$$

The question is whether this means

$$8/(3\ s_1^2/l), \text{ or } (8/3\ s_1^2)/l$$

as the value of the second term. It seems that it would be well for the sake of clarity to put either the denominator or the numerator of the fraction into a bracket as shown above. Ambiguity may occur where there is only one solidus, for example,

$a/b+c$ may mean $a/(b+c)$, or $(a/b)+c$.

**Henry M. Sayers.**

Streatham, *December 21st*, 1929.

## The Price of Electricity.

I do not think that the public generally, and perhaps even the electrical industry itself, realises the rapid fall there has been in the cost of electricity, especially for domestic purposes other than lighting.

The enclosed memorandum shows the number of undertakings that supply electricity for purposes other than lighting at 1d. per unit or less, and the population served by such undertakings. The figures show that 28 millions, out of a total population of 43 millions, or 65 per cent. of the population of Great Britain, live in areas of supply where electricity can be obtained, for purposes other than lighting, at 1d. per unit or less.

The figures in the memorandum are based on the running charge in the two-part tariff, or the flat rate for heating and cooking, special rates for water heating being excluded.

The comparative figures for the previous year are also given, and it will be noted that there is a very substantial increase, especially in the number of undertakings supplying electricity for the purposes named at ¾d. per unit and under.

**W. A. Vignoles,**
*Director and Secretary,*
BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION.

London, W.C.2, *December 23rd*, 1929.

[The memorandum referred to in Lieut.-Col. Vignoles's letter contains the following particulars regarding 280 electricity supply authorities in Great Britain :—

| | Number of Undertakings. | Tariff of charge per kWh. | | Population served. | Year. |
|---|---|---|---|---|---|
| | 33 | .5d. | | 7,104,750 | 1929 |
| | 16 | .5d. | | 4,927,652 | 1928 |
| Increase | 17 | | Increase | 2,177,098 | |
| | 22 | .55d. to .7d. | | 3,700,900 | 1929 |
| | 6 | .55d. to .7d. | | 596,610 | 1928 |
| Increase | 16 | | Increase | 3,104,290 | |
| | 69 | .75d. | | 6,201,150 | 1929 |
| | 37 | .75d. | | 5,833,021 | 1928 |
| Increase | 32 | | Increase | 368,129 | |
| | 16 | .8d. to 9d. | | 1,311,000 | 1929 |
| | 11 | .8d. to .9d. | | 1,164,765 | 1928 |
| Increase | 5 | | Increase | 146,235 | |
| | 140 | 1d. | | 9,175,200 | 1929 |
| | 116 | 1d. | | 9,826,528 | 1928 |
| Increase | 24 | | Decrease | 651,328 | |
| | 124 | .75d. and under | | 17,006,800 | 1929 |
| | 59 | .75d. and under | | 11,357,283 | 1928 |
| | 65 | | | 5,649,517 | |
| Increase | 110% | | Increase | 50% | |
| | 280 | 1d. and under | | 27,493,000 | 1929 |
| | 186 | 1d. and under | | 22,348,576 | 1928 |
| | 94 | | | 5,144,424 | |
| Increase | 50% | | Increase | 23% | |

NOTE.—In some cases the population served is somewhat larger than shown, as figures are not available for a few undertakings. The population of Great Britain is 43,600,000.—EDS. ELEC. REV.]

## The Heating of Greenhouses.

The writer is interested in collecting information with regard to the increased efficiency of low-pressure hot-water systems, as applied to greenhouses by the use of electrically-driven accelerators.

There would seem to be a field for this development in rural areas, and I should be glad to be put in touch with anyone who has some definite data on the subject.

**Ralph Hall,**
*Ashford Manager,*
H. FEATHERSTONE.

Ashford, *December, 20th*, 1929.

### Standardisation of Sizes of Advertisement Pages.

We note the correspondence in your pages in connection with the above which was started by the Incorporated Society of British Advertisers, and should like to support same.

We fully agree that reduction of the different number of size of page to three should considerably simplify matters where the preparation of advertisements is concerned, besides reducing the expense for blocks, &c.

**Venner Time Switches, Ltd.,**

R. C. GRASEBY, *Managing Director.*

London, S.W.1, *December 30th*, 1929.

# Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

## 1928.

16,282. "Earth-fault electric protective arrangements for alternating-current generators." International General Electric Co., Inc. June 4th, 1927. (291,721.)

16,485. "Television apparatus and the like." J. L. Baird and Television, Ltd. June 6th, 1928. (322,481.)

16,717. "Electrically-heated apparatus for the treatment of the body." Dr. R. Blum, Jun. June 8th, 1928 (convention date not granted). (291,799.)

19,366. "Electromagnetically-wound clockwork mechanism." A. Szente. July 4th, 1928. (322,482.)

19,418. "System for transmitting alarm signals over telephone lines." Siemens and Halske Akt. Ges. December 20th, 1927. (302,678.)

19,910. "Transmission of an image to a distance." F. H. Rogers (Skala Research Laboratories, Inc.). July 9th, 1928. (322,504.)

22,103. "Loud-speakers and the like." M. L. B. Holck. July 30th, 1928. (322,484.)

22,206. "Apparatus for collecting electrical oscillations." G. Lakhovsky. July 31st, 1928. (322,485.)

22,317. "Means for protecting electrical apparatus." British Thomson-Houston Co., Ltd. August 1st, 1927. (294,945.)

24,457. "Insulating covers for electrical switches, bell-pushes, ceiling roses, and the like." J. A. Crabtree and J. R. Dolphin. August 25th, 1928. (322,434.)

24,824. "Loud-speakers and the like." Standard Telephones and Cables, Ltd., and E. K. Sandeman. August 29th, 1928. (322,470.)

24,825. "Composite signalling systems such as combined telegraph and telephone systems." Standard Telephones and Cables, Ltd. (Western Electric Co., Inc.). August 29th, 1928. (322,487.)

24,871. "Treatment of gases and vapours with electric arc discharges." J. Y. Johnson (I. G. Farbenindustrie Akt. Ges.). August 29th, 1928. (322,471.)

24,958. "Electric time switches" Marks, Baron (Hart Manufacturing Co.). August 30th, 1928. (322,509.)

25,212. "Electric switches." C. McAllister and A. Munn. September 3rd, 1928. (322,443.)

25,223. "Automatic electrical voltage or current regulators." General Electric Co., Ltd., and F. Hopewell. September 3rd, 1928. (322,510.)

25,260. "Sealing chambers for electric cables." Callender's Cable and Construction Co., Ltd., and A. E. Wilson. September 3rd, 1928. (322,444.)

25,321. "Automatic switch indicator for electrical prepayment meters." H. C. Wingfield. September 4th, 1928. (322,477.)

25,414. "Induction-type electricity meters." H. E. Angold and Smith Meters, Ltd. September 4th, 1928. (322,513.)

25,602. "Device for the control of the measure of transmission in telephone systems, amplifying systems, or the like." W. Hahn and H. Warncke. September 6th, 1928. (322,517.)

25,614. "Ironless induction furnaces." Hirsch, Kupfer-und Messing-Werke Akt. Ges. March 2nd, 1928. (307,044.)

25,692. "Terminals for electrical heating elements." R. Maddison and Associated Electrical Industries, Ltd. September 7th, 1928. (322,520.)

25,726. "Electrostatic acoustic device for transmitting and receiving purposes." Newcombe-Hawley, Inc. March 12th, 1928. (307,733.)

25,769. "Impulse generators for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. September 7th, 1928. (322,526.)

25,770. "Electromagnetic relays." Associated Telephone and Telegraph Co. October 24th, 1927. (299,360.)

25,854. "Use of rectifier couples in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and T. Blashill. September 8th, 1928. (322,533.)

25,867. "Oil tanks for oil-immersed electrical apparatus, such as transformers." J. B. Hansell and Associated Electrical Industries, Ltd. September 8th, 1928. (322,534.)

26,212. "Polyphase protective or regulating apparatus." Akt. Ges. Brown, Boveri et Cie. September 12th, 1927. (297,039.)

26,427. "Overload protective arrangements." International General Electric Co., Inc. September 14th, 1927. (297,091.)

26,428. "Formers for inductance coils and the like." Edison Swan Electric Co., Ltd., and T. F. Stent. September 14th, 1928. (322,554.)

26,460. "Cores for electric induction coils." Callender's Cable and Construction Co., Ltd., L. G. Brazier, and J. Urmston. September 14th, 1928. (322,555.)

26,969. "Electric meters." F. S. S. Wates. September 20th, 1928. (322,558.)

27,081. "Radio receiving sets with a number of sets of headphones." State Railways Radio Co., Ltd., and L. Zoltan. September 21st, 1928. (322,559.)

27,769. "Fuse insulators." T. Bailey. September 27th, 1928. (322,565.)

27,813. "Signalling systems used in mines and like places." A. E. Moore. September 28th, 1928. (322,566.)

27,976. "Electric switches." R. C. Graseby. September 29th, 1928. (322,568.)

27,977. "Intervalve transformers employed in radio apparatus." Igranic Electric Co., Ltd., and A. D'A. Hodgson. September 29th, 1928. (322,569.)

28,586. "Telephonic loud-speakers." D. S. B. Shannon. October 5th, 1928. (322,579.)

28,850. "Interrupters for electric ignition apparatus." G. Simonis. October 8th, 1928. (322,581.)

29,257. "Wireless receiving apparatus." T. A. Biddington and R. Field. October 11th, 1928. (322,584.)

29,312. "Circuit breakers." G. Pailin and Ferguson, Pailin, Ltd. October 11th, 1928. (322,585.)

30,132. "Means for regulating the phase displacement in an electrical system." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). October 18th, 1928. (322,592.)

30,667. "Electric condensers." Siemens Bros. & Co., Ltd., and J. R. Thorpe. October 23rd, 1928. (322,595.)

30,862. "Insulated joints for electric conductors." Anode Rubber Co., Ltd. October 28th, 1927. (299,463.)

31,196. "Electrically heating rivets and other articles." British Insulated Cables, Ltd., and L. B. Wilson. October 27th, 1928. (322,600.)

31,810. "High-tension electric distributing and switching apparatus." Condit Electrical Manufacturing Corporation. February 6th, 1928. (305,526.)

31,874. "Electric switches." General Electric Co., Ltd., E. H. Croft, W. J. Paddock, and W. Wilson. November 1st, 1928 (322,603.)

32,410. "Means for electroplating." W. J. Pitt. November 6th, 1928. (322,611.)

32,606. "Radio or wireless aerials (antenna) for emission or reception." W. R. Everett. November 8th, 1928. (322,614.)

32,660. "Fuse insulator." T. Bailey. November 8th, 1928. (322,615.)

33,215. "Loud-speakers." R. A. Rothermel November 13th, 1928. (322,622.)

33,652. "Contacts for circuit interrupters." Associated Electrical Industries, Ltd. November 30th, 1927. (301,461.)

33,991. "Fusible cut-outs." Whipp & Bourne, Ltd., and F. Whipp. November 20th, 1928. (322,627.)

34,793. "Electrical switchgear." D. R. Davies and Associated Electrical Industries, Ltd. November 26th, 1928. (322,634.)

36,027. "Electrical alternating-current rectifiers." Süddeutsche Telefon-Apparate Kabel-und Drahtwerke Akt. Ges. December 6th, 1927. (301,839.)

36,424. "Method of manufacturing alternating-current rectifiers." Süddeutsche Telefon-Apparate Kabel-und Drahtwerke Akt. Ges. December 10th, 1927. (302,177.)

36,952. "Automatic telephone selector banks and selectors." Siemens Bros. and Co., Ltd., and E. A. Forceville. December 14th, 1928. (322,652.)

37,421. "Electric switch mechanisms." British Thomson-Houston Co., Ltd. December 22nd, 1927. (302,913.)

37,929. "Electrical discharge devices." British Thomson-Houston Co., Ltd. (W. D. Coolidge). December 22nd, 1928. (Addition to 279,444.) (322,662.)

## 1929.

8. "Arrangements for modulating the frequency of electric oscillations." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabricken). January 1st, 1929. (322,667.)

218. "Electric lamp fittings." Revo Electric Co., Ltd., and F. H. Reeves. January 3rd, 1929. (Cognate application 9,781/29.) (322,670.)

1,939. "Röntgen tubes." Radiologie Akt. Ges. and F. Bennemann. January 19th, 1929. (322,680.)

2,047. "Insulators." Bullers, Ltd., and J. G. Miller. January 21st, 1929. (322,682.)

2,520. "Electric imitation fires." H. H. Berry. January 24th, 1929. (322,688.)

2,737. "Diaphragms or membranes for the reproduction and amplification of sounds." A. D. Legge. January 26th, 1929. (322,689.)

3,400. "Relay systems for paralleling electrical circuits." Associated Electrical Industries, Ltd. February 1st, 1928. (305,176.)

3,949. "Electric high-tension transmission systems." W. P. Digby and R. B. Fairthorne. February 6th, 1929. (322,692.)

3,952. "Contact-preventing devices for electric incandescent lamps." B. Brammer. February 7th, 1928. (305,581.)

4,135. "Diaphragm for sound receiving and emitting devices." H. W. F. X. Beckers. February 9th, 1928. (305,669.)

4,543. "Electric switches." British Thomson-Houston Co., Ltd. February 10th, 1928. (305,938.)

6,546. "High-frequency signalling systems." British Thomson-Houston Co., Ltd. March 27th, 1928. (308,716.)

6,962. "Electric switches." A. P. Lundberg & Sons, Ltd., G. C. Lundberg, P. A. Lundberg, and G. Pegg. March 4th, 1929. (322,703.)

7,739. "Mountings for electric switches, sockets, or other couplings or fittings." J. R. Stevenson. March 9th, 1929. (322,705.)

10,821. "Electromagnets for magnetic separators or the like." F. Krupp Grusonwerk Akt. Ges. April 18th, 1928. (309,950.)

14,207. "Mercury electric switches." Dr. P. Meyer Akt. Ges. May 7th, 1928. (311,243.)

34,540. "Apparatus for regulating voltage in alternating-current distributing systems." J. E. Pollak (Ganz-Fele Villamossagi Reszvenytarasasag). June 1st, 1928. (Divided application on 322,199.) (322,500.)

## Energy Consumption of Electric Steel Furnaces.

According to the *Electrical World*, an average consumption of 1,595 kWh per ton of steel castings produced in a year, of which 1,110 kWh is for melting, 270 for annealing, and the remainder for handling, for incidental power and for lighting, is shown by the operating records of the Sivyer Steel Casting Company, Milwaukee, Wis. In terms, not of castings produced, but of metal charged, which is the customary manner of statement, the average furnace performance is 625 kWh per ton. Naturally, these figures can be of only approximate value in comparison with, or in application to, other foundries, since they cover a wide range of carbon and alloy castings, in which the Sivyer company specialises. But these alloy and carbon steels are all of high grade, and the data given may be taken as representative of electricity consumption when close control of quality of product is a paramount consideration.

Two melting furnaces are installed. The larger has a capacity of 3 tons, and the smaller of ½ ton; in practice the charges, consisting of steel turnings and short scrap, are of 6,800 and 1,500 lb., respectively. The transformer for the larger furnace has a rated capacity of 1,500 kVA, and is provided with taps to deliver current to the furnace at either 120 volts (high tap) or 85 volts (low tap). A special circulation system has been provided to prevent overheating of the transformer oil in those periods when the furnace is run at its capacity for a long period. The furnace is equipped with the usual regulators, with instruments to indicate the distribution of current between the three phases and with a demand meter for showing the power used at any time during the fifteen-minute period which is used as a basis for determining the demand. The small furnace has a 300-kVA transformer provided with taps to furnish voltages of 155, 130, 100, and 60 volts.

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

ABRAM.—Additional 130 houses, for the U.D.C.; surveyor.

ASHFORD (KENT).—Engine running shed and workshops, &c. (£80,000), for the Southern Railway Co.; G. Ellson, chief engineer.

AIRDRIE.—Additions at Alexandra Primary School (£12,000); master of works, education authority, Hamilton.

AYRSHIRE.—Church and chapel house, for St. Mary's Congregation, Largs; Rev. Father Doherty, parish priest, Largs.

BATH.—Extensions, Spa Hotel (£15,000); Jacob Long & Sons, Ltd., builders.

BELPER.—Additional 56 houses, for the R.D.C.; surveyor.

BIRMINGHAM.—Housing scheme, Wheelwright estate, Erdington; city engineer.

BLACKPOOL.—Rebuilding Trocadero Hotel, Restaurant and Cinema; Sir Lindsay Parkinson & Co., Ltd., contractors, Talbot Saw Mills.

BLYTH.—Housing scheme, Hodgsons Lane. Mixed school (480 places). Practical instruction rooms at four schools. Waterworks, Horton (£41,600); borough engineer.

BOURNEMOUTH.—Houses (30), Seafield Road; M. Brown and Sons. Alterations and additions, Overcliffe Hotel, Grand Avenue; R. & M. Foulsham. 'Bus and coach station, The Square; Hants & Dorset Motor Services, Ltd. Motor coach station, Christchurch Road; Bournemouth Motor Station, Ltd. Shops, showrooms and offices, Westover Road; W. Hayward. Bakery, Cleveland Road; Poole & Bournemouth Co-operative Society.

BRISTOL.—Public baths, Bedminster (£62,000), for the T.C.; city engineer.

CARLISLE.—Technical and central schools (£70,000); master of works, Education Committee.

CHADWELL HEATH (ESSEX).—Baptist church and schools (£10,000); trustees.

CHATTERIS.—Senior school (400 places) and extensions King Edward school; Isle of Ely E.C.

CHICHESTER.—Additional 50 houses for the City Council; city surveyor.

CLITHEROE.—School, Chatburn Road, with electric heating installation, for the T.C.

COATBRIDGE.—School (960 places); master of works, Lanarkshire Education Authority, Hamilton.

COVENTRY.—Sewage disposal works; E. H. Ford, city engineer, Council House (deposit £5 5s.).

CRANBROOK.—Housing scheme (54), for the R.D.C.; surveyor.

DAWDON COLLIERY.—Pithead baths (£30,000), for the Miners' Welfare Committee; secretary.

DEWSBURY.—Hospital extensions and nurses' home (£5,500), for the Joint Hospital Board; borough surveyor.

DUMFRIES.—Town Hall, for the T.C.; J. Carruthers, 209, St. Vincent Street, Glasgow.

DUNBAR.—Housing scheme (81); burgh surveyor.

DUNDEE.—Dock improvements; secretary, Dundee Harbour Trust.

EAST RAINTON.—School, for Durham County E.C.; director of education, Durham.

EDINBURGH.—Sanatorium at Merchiston Castle School, Colinton (£7,000); the headmaster. Workmen's institute at Portabello to accommodate 330; secretary, Jewel Institute Scheme Trustees, Portobello.

FALKIRK.—Reconstruction of Grand Theatre as picture house (£12,000); secretary, Associated British Cinemas (Ltd.), 149, Regent Street, London. Road improvement scheme (£80,000); burgh surveyor.

FARINGDON.—Housing scheme (58), for the R.D.C.; A. Buller West, architect, The Knowl, Abingdon (returnable deposit of £2 2s.).

FENTON (STAFFS.).—Oil depôt, King Street; Anglo-American Oil Co., Ltd.

FLEETWOOD.—Central school, with electric heating, for the Lancs. County Council.

GLASGOW.—Houses (66), North Street, Whiteinch: houses at Germiston and Balornock, for Corporation; architect, Corporation Housing Department. Estate development, Netherhauld House; Nether Pollok, Ltd.

GOSPORT.—Primitive Methodist schools; trustees.

GUILDFORD.—Grammar school extensions (£19,260), for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

HAWICK.—Reconstruction of High School (£40,000); master of works, Education Authority.

HULL.—Primitive Methodist church, Charterlands Avenue; trustees.

KELSALL.—Elementary school (£16,000); Cheshire E.C.

KIDSGROVE.—Primitive Methodist church; trustees.

LEITH.—Maternity hospital, for Edinburgh Corporation Public Health Committee; city architect, Edinburgh.

LIVERPOOL.—Cinema, Lime Street and Elliot Street (£200,000), for Associated British Cinemas, Ltd.

LONDON (POPLAR, E.).—Reconstruction scheme, Collins Place area; borough engineer.

(ILFORD, E.).—Extensions, isolation hospital (£39,760): houses (120), Tomswood Hill; borough engineer. Houses (72), Wangey Hall estate; F. Smith. Houses (36), Horace Road; W. Longworth. Shops (15), Longbridge Road; E. Meredith.

(HORNSEY, N.).—Extensions Stationers' School and High School; Middlesex E.C.

(MUSWELL HILL, N.).—Four shops, Firs Parade; Murrell and Pigott, 44, Bedford Row, W.C.

(KILBURN, N.W.).—Extensions, Maria Grey Training College (£20,000); Teachers' Training & Registration Society.

(STREATHAM, S.W.).—School, Stockport Road; C. H. Deane and Son.

(ACTON, W.).—Estate development, Willesden Lane, Western Avenue, and Leamington Park; William Atkinson.

MANCHESTER.—Cinema; F. Read, A. L. Ward, and A. Snape.

MARKET BOSWORTH.—R.C. church; parish priest, St. Martin of Toms Parish.

MARPLE.—Elementary school (£17,000); Cheshire E.C.

MEXBOROUGH (YORKS.).—Church, Park Road and Cemetery Road, for Rev. Canon Leteux; contractors, Robinson Bros., Denaby, near Rotherham.

MORDEN.—School, St. Helier's housing estate, for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

OTLEY.—Housing scheme (100), Westbourne Park estate; surveyor to U.D.C.

OUTWELL.—Junior and senior schools; Isle of Ely E.C.

PRESTON.—School clinic and maternity and child welfare centre, Cuttle Street; borough surveyor.

PRESTWICH.—Additional 131 houses, for the U.D.C.; surveyor.

RAWTENSTALL.—Housing scheme (50); borough surveyor.

RICHMOND.—Secondary school for boys, Penthouse Common; Surrey E.C.

SEAHAM HARBOUR.—Post office; Postmaster-General.

SKEGNESS.—Housing scheme (49), for the U.D.C.; W. F. Wills, architect.

STOKE-ON-TRENT.—Extensions, Tuscan Works; H. S. and L. S. Plant, Ltd.

TRURO.—Extensions, High School (£7,000 to £8,000); Canon the Hon. R. J. Yarde Buller.

TUNSTALL.—Houses (150), Little Chell Lane; Stoke city engineer.

WHITEHAVEN.—Joint Methodist church, Kells; trustees.